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Luther H. Hodges, Secretary

OFFICE OF TECHNICAL SERVICES
John C. Green, Director

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MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS. CDS CRYSTAL GROWTH BY SUBLIMATION AND BY CHEMICAL TRANSPORT. PHOTOELECTRONIC ANALYSIS OF CRYSTALS. HIGH-RESISTIVITY PHOTOCONDUCTORS. SURFACE PHOTOVOLTAGE MEASUREMENTS ON CUS.
AD-278 050 DIV. 25

TENSILE STRENGTH OF MAGNESIUM OXIDE: WI-CRYSTALS AND TRI-CRYSTALS WERE CHEMICALLY POLISHED TO REMOVE SURFACE DISLOCATION SOURCES. THE WI-CRYSTALS DEFORMED ELASTICALLY UP TO 110,000 PSI BEFORE SEPARATING FROM TENSILE GRIPS.
AD-278 209 DIV. 25

*CYCLOHEXANONES

SYNTHESIS AND PROPERTIES OF SOME POLYPHENYLS AND BROMINE-SUBSTITUTED POLYPHENYLS. REACTIONS INVOLVING MONO-, DI-, AND TRIBROMOPOLYPHENYLS: TRI- AND TETRAPHENYL BENZENES. DIENIC ISOMERISM: CATALYTIC DEHYDRATION OF CARBONYL-CONTAINING COMPOUNDS.
AD-278 110 DIV. 4

*CYCLONES

CYCLOGENESIS IN THE COLORADO ROCKY MOUNTAIN AREA.
AD-278 069 DIV. 2

*CYCLOOCTATETRAENE

CYCLOOCTATETRAENE (COT) COMPLEXES WITH IRON TRICARBONYL: X-RAY DIFFRACTION STUDIES OF (COT)FE(CO)3 AND (OC)3FE(COT)FE(CO)3 SINGLE CRYSTALS WERE MADE AND THEIR MOLECULAR AND VALENCE STRUCTURES ARE DISCUSSED.
AD-278 208 DIV. 4

MEAT XM819; HIGH SPEED PHOTOGRAPHY ANALYSIS.
AD-278 197 DIV. 22

*APPLIED MATHEMATICS

THE PROCEDURES REQUIRED IN THE APPLICATION OF LINEAR OPERATOR THEORY TO ONE ASPECT OF SYSTEMS ANALYSIS, WHICH IS THE TREATMENT OF EXPERIMENTAL OR DATA PROCESSING.
AD-278 143 DIV. 30

*ARC WELDS

IMPROVEMENT IN GRAIN REFINEMENT AND ELIMINATION OF THE CHARACTERISTIC DENDRITIC CAST METAL SOLIDIFICATION PATTERN WERE THE PRINCIPAL EFFECTS OF ELECTROMAGNETIC STIRRING AND SONIC VIBRATION OF AL ALLOY ARC WELDS.
AD-278 122 DIV. 17

*ARSENIDES

HIGH-TEMPERATURE SEMICONDUCTORS: HIGH CONCENTRATIONS OF LATTICE DEFECTS CAN BE INTRODUCED INTO GAAS. CZOCHRALSKI APPARATUS OPERATING FOR PRODUCTION OF GAP. DISSOCIATION PRESSURE STUDIES FOR GAAS.
AD-278 049 DIV. 25

DESIGN OF FURNACE FOR PULLING 7 IN. DENDRITES. USE OF ALN FOR CRUCIBLES. PREPARATION OF GAAS SOLAR CELLS BY CLOSED TUBE DIFFUSION OF ZN OR CD.
AD-278 251 DIV. 4

*ASTRONOMICAL DATA

LINEAR ERROR ANALYSIS OF A DIFFERENTIAL CORRECTION PROCEDURE USED FOR ASTRODYNAMICAL DATA REDUCTION. DEFINITION AND DEVELOPMENT OF THE CLASS OF GENERALIZED LEAST SQUARES ESTIMATORS. RIGOROUS LEAST SQUARES AND UNWEIGHTED LEAST SQUARES ESTIMATORS AS SPECIAL CASES.
AD-278 266 DIV. 2

*ATMOSPHERE

A SURVEY OF HIGH-ALTITUDE ATMOSPHERIC TEMPERATURE SENSORS AND ASSOCIATED PROBLEMS.
AD-278 152 DIV. 2

*ATMOSPHERE
SCATTERING

UNIQUENESS PROBLEMS IN THE MATHEMATICS OF MULTIPLE SCATTERING. SOME RECENT MATHEMATICAL STUDIES CONCERNING THE UNIQUENESS OF SOLUTIONS TO CHANDRASEKHAR'S MATHEMATICAL FORMULATION OF PRINCIPLES OF INVARIANCE IN THE THEORY OF RADIATIVE TRANSFER.
AD-278 263 DIV. 15

*ATMOSPHERIC SOUNDING

IT IS SHOWN THAT WHEN AN IONOSPHERIC SOUNDER IS PLACED AT A DISTANCE FROM THE SEA LESS THAN 50 KM, THE STRONG BACKSCATTER FROM THE OPEN SEA WAVES AND FROM THE COASTAL SEA WAVES PRODUCES DISCRETE ECHOES WHICH MAY BE ERRONEOUSLY ATTRIBUTED TO MESOSPHERIC REFLECTIONS.
AD-277 982 DIV. 8

*ATOMIC BOMB DAMAGE

THE DYNAMIC RESPONSE OF SHALLOW-BURIED ARCHES SUBJECTED TO BLAST LOADING.
AD-278 265 DIV. 13

*ATOMIC SPECTRUM

PROBABILITIES OF OPTICAL TRANSITIONS FOR ATOMS AND DIATOMIC MOLECULES.
AD-278 085 DIV. 25

*ATOMIC STRUCTURE

THE ELECTRONIC STRUCTURE OF SOLUTE ATOMS IN SMALL CONCENTRATIONS IN SOLID SOLUTIONS AND THE SHORT-RANGE FORCES IN SUCH ALLOYS ARE BEING STUDIED. THE CR END OF THE CR-AL BINARY SYSTEM IS BEING USED.
AD-277 994 DIV. 25

*AVIATION FUELS

PROMISING HYDROCARBON FUELS FOR AIR FORCE REQUIREMENTS ARE ALKYL-SUBSTITUTED MONOCYCLICS AND BICYCLICS FOR HIGH TEMPERATURE; ISOPARAFFIN AND TRICYCLIC STRUCTURES FOR SPECIALIZED FUELS; BICYCLICS AND VAPOR FUELS FOR FLIGHT BEYOND MACH 5; AND ENDOTHERMIC FUEL BEYOND MACH 5.
AD-277 953 DIV. 10

*AVIATION SAFETY

NUMERICAL EVALUATIONS OF VARIOUS STRESS LEVELS AND INSPECTION PERIODS OF AIRCRAFT. APPROPRIATE INSPECTION PERIODS WERE DETERMINED AND COMPARED WITH CRACK PROPAGATION TIME TO FINAL FAILURE.
AD-278 171 DIV. 17

*BACTERIA

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 359 DIV. 3

*BACTERIAL AEROSOLS

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 359 DIV. 3

*BAND-PASS FILTERS

DEVELOPMENT OF AN E-BAND AMPLIFIER. DETAILS ARE PRESENTED ON THE CURRENT STATUS OF RELEVANT TUBE DEVELOPMENT, AND PROGRESS MADE ON THE NON-RECIPROCAL ELECTRICALLY-TUNABLE FILTER EMPLOYING YIG SPHERES.
AD-277 930 DIV. 8

*BARIUM COMPOUNDS

COMMENTS ON THE NEUTRON SPECTRUM OF FERROELECTRIC AND PARAELECTRIC BARIUM TITANATE.
AD-278 070 DIV. 25

*BEAMS

STATIC AND DYNAMIC LOADING TESTS WERE CONDUCTED ON PRETENSIONED CONCRETE BEAMS TO DETERMINE HOW FLEXURAL MEMBERS SHOULD BE DESIGNED; HOW TO GAIN THE GREATEST RESISTANCE TO BLAST LOADING; AND THE BEST WAY TO DESTROY SUCH STRUCTURES.
AD-278 118 DIV. 13

SONIC FATIGUE LIFE DETERMINATION OF AIRFRAME STRUCTURES BY SIREN TESTING.
AD-278 173 DIV. 1

TESTS WERE CONDUCTED ON BEAMS AND ON REINFORCING BAR COUPONS TO DETERMINE THE RESISTANCE AND BEHAVIOR OF SIMPLE-SPAN REINFORCED CONCRETE BEAMS SUBJECTED TO IMPULSIVE LOADING.
AD-278 219 DIV. 13

*BERYLLIUM COMPOUNDS

PROPERTIES OF ANHYDROUS NITRATES OF TRANSITION ELEMENTS; REACTIONS OF ANHYDROUS CU(NO3)2 WITH ETHERS ARE EXPLAINED TENTATIVELY. AN ACCOUNT IS GIVEN OF REACTION PRODUCTS BETWEEN BASIC ZN ACETATE AND N2O4. CRYSTALLOGRAPHIC STUDIES CONCENTRATED ON CU(NO3)2-NITROMETHANE ADDUCT AND BASIC BERYLLIUM NITRATES.
AD-278 357 DIV. 4

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ELECTRODES

ACID ELECTROLYTE SYSTEMS WERE USED IN THE STUDY OF ELECTRODE REACTIONS AT INDIVIDUAL ANODES OR CATHODES ENTAILING OXIDATION OR REDUCTION OF THE FOLLOWING FUELS AND OXIDANTS HYDRAZINE; FORMALDEHYDE; UREA; AIR; O2; NO2. PRINCIPLES OF CELL OPTIMIZATION ARE DISCUSSED.
AD-278 353 DIV. 7

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POWER SUPPLIES

ABSTRACTS FROM UNCLASSIFIED LITERATURE PRESENTED ON SUBJECT OF FLIGHT VEHICLE POWER AND REFERENCES IN THE FIELDS OF MATERIALS.
AD-278 130 DIV. 7

*BIOLOGICAL STAINS

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 359 DIV. 3

*BLOOD CHEMISTRY

RANDOM-SEXED POPULATIONS OF SMALLER LABORATORY ANIMALS. ESTABLISHMENT OF BASELINE STANDARDS THROUGH THE STUDY OF VALUES OBTAINED FROM THE INVESTIGATION OF SOME OF THE HEMATOLOGICAL ELEMENTS ASSOCIATED WITH THE PHYSIOLOGY OF LABORATORY ANIMALS, USING SEMIMICROTECHNIQUES, ULTRAMICROTECHNIQUES, AND ELECTROMEDICAL TECHNIQUES.
AD-278 368 DIV. 16

*BLUNT BODIES
BOUNDARY LAYER

MATHEMATICAL ANALYSIS OF THE BOUNDARY CONDITIONS AT THE OUTER EDGE OF THE BOUNDARY LAYER ON BLUNTED CONICAL BODIES.
AD-278 017 DIV. 9

*BONDING

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND DIFFUSION AND SOLID-STATE BONDING. PROPERTIES RECOMMENDING REFRACTORY METALS AND GRAPHITE TO AEROSPACE APPLICATIONS ARE DISCUSSED.
AD-278 193 DIV. 8

*BORON COMPOUNDS
CHEMICAL BONDS

CU2B10H10 STRUCTURE; X-RAY DIFFRACTION STUDY CONFIRMED THE D SUB 4D SYMMETRY FOR THE B10H10(--) ION AND ESTABLISHED THE COVALENT NATURE OF THE INTERACTIONS OF CU SUPERSCRIPT I B ATOMS FORMING THE EDGES OF THE POLYHEDRON.
AD-278 206 DIV. 4

*BORON COMPOUNDS
HYDRIDES

CLINICAL TESTING OF TISSUE; HUMAN PLASMA FOR RECOVERY OF BORON AFTER EXPERIMENTAL AND ACCIDENTAL EXPOSURE TO BORON COMPOUNDS OF DECABORANES; BORON HYDRIDES; BORIC ACID; AND BORATES UNDER VARIOUS CONDITIONS OF OIL-WATER DISTRIBUTION. TOXICITY OF DECABORANES.
AD-278 360 DIV. 4

*BORON COMPOUNDS
POLYMERIZATION

THE SYNTHESIS AND CHEMISTRY OF B POLYMERS INVOLVING PENTABORANES, DECABORANES, B10H9 AND B10H12 LIGAND COMPOUNDS, ARE DISCUSSED. THIS RESEARCH IS AIMED AT THE PRODUCTION OF MATERIALS STABLE TO HEATING AT OR ABOVE 1000 F.
AD-278 056 DIV. 4

*BRASS

EXPLOSIVE WELDING OF AL, BRASS, CU, STEEL, AND TA IN VARIOUS COMBINATIONS OF SINGLE AND MULTIPLE WELDS IS DISCUSSED. WORK-HARDENING DATA AND MICROSTRUCTURE INDICATE THE METALLURGICAL PROPERTIES OF THESE WELDS OF SIMILAR AND DISSIMILAR METAL COMBINATIONS.
AD-278 354 DIV. 17

*BRAZING

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND DIFFUSION AND SOLID-STATE BONDING. PROPERTIES RECOMMENDING REFRACTORY METALS AND GRAPHITE TO AEROSPACE APPLICATIONS ARE DISCUSSED.
AD-278 193 DIV. 8

*BREMSSTRAHLUNG

HIGH ENERGY PLASMA GENERATION AND CONTROL.
AD-278 153 DIV. 25

*BROMINE

MICROANALYSIS; OXYGEN FLASK COMBUSTION AND VOLUMETRIC ANALYSIS OF CL, BR, I AND S IN CHEMICAL AGENTS.
AD-278 160 DIV. 4

*BURNS

TRAUMATIC SURGERY AND SHOCK; RADIATION AND THERMAL BURNS; RIBOFLAVIN METABOLISM IN BURNED RATS; CALCIUM INFUSION TEST FOR HYPERPARATHYROIDISM; METABOLIC STUDIES OF PSEUDOMONAS INFECTION.
AD-278 064 DIV. 16

*BUTADIENES

CYCLOOCTATETRAENE (COT) COMPLEXES WITH IRON TRICARBONYL; X-RAY DIFFRACTION STUDIES OF (COT)FE(CO)3 AND (CO)3FE(COT)FE(CO)3 SINGLE CRYSTALS WERE MADE AND THEIR MOLECULAR AND VALENCE STRUCTURES ARE DISCUSSED.
AD-278 208 DIV. 4

*CADMIUM COMPOUNDS
SULFIDES

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS. CDS CRYSTAL GROWTH BY SUBLIMATION AND BY CHEMICAL TRANSPORT. PHOTOELECTRONIC ANALYSIS OF CRYSTALS. HIGH-RESISTIVITY PHOTOCONDUCTORS. SURFACE PHOTOVOLTAGE MEASUREMENTS ON CUS.
AD-278 050 DIV. 25

*CALCULUS OF VARIATIONS

CONTROL PROBLEMS WERE STUDIED IN WHICH CONSTRAINTS THAT ARE INDEPENDENT OF THE CONTROL ARE IMPOSED ON THE STATE VARIABLES. NECESSARY CONDITIONS THAT HOLD ALONG AN OPTIMAL TRAJECTORY ARE DERIVED SIMPLY FROM KNOWN RESULTS IN THE CALCULUS OF VARIATIONS.
AD-278 262 DIV. 15

*CAMERA TUBES

STUDY OF MATERIAL INTERACTION AND MIGRATION IN CAMERA TUBES.
AD-278 042 DIV. 8

***ELECTROLYSIS**

ELECTRICAL BEHAVIOR OF PASSIVE IRON AND NICKEL WAS STUDIED. IRON MAY BE MADE PASSIVE BY MAKING IT AN ANODE IN AN ACID SOLUTION AND PASSING A HIGH CURRENT THROUGH THE CELL. THE NICKEL SYSTEM CAN BE CYCLED, PASSIVATED READILY, AND RECLEANED.
AD-278 213 DIV. 25

***ELECTROLYTIC CELLS**

ACID ELECTROLYTE SYSTEMS WERE USED IN THE STUDY OF ELECTRODE REACTIONS AT INDIVIDUAL ANODES OR CATHODES ENTAILING OXIDATION OR REDUCTION OF THE FOLLOWING FUELS AND OXIDANTS HYDRAZINE, FORMALDEHYDE, UREA, AIR, O2, NO2. PRINCIPLES OF CELL OPTIMIZATION ARE DISCUSSED.
AD-278 353 DIV. 7

***ELECTROMAGNETIC FIELDS**
HAZARDS

RADIOFREQUENCY TESTING AND MISCELLANEOUS METHODS LEADING TO PERFECTION OF INSTRUMENTATION OF ELECTRO-EXPLOSIVE DEVICES.
AD-278 385 DIV. 22

***ELECTROMAGNETIC WAVES**

THE MODAL SPECTRUM OF A LOSSLESS, HOMOGENEOUS AND ISOTROPIC PLANAR PLASMA IS SHOWN TO CONTAIN CONTRIBUTIONS FROM SURFACE WAVES AND COMPLEX MODES IN ADDITION TO THE USUAL CONTINUOUS SPECTRUM CHARACTERISTICS OF OPEN STRUCTURES.
AD-278 127 DIV. 8

THE KARAL-KELLER THEORY OF WAVE PROPAGATION.
AD-278 280 DIV. 25

***ELECTRON BEAMS**

EXPERIMENTS WITH A NEW TYPE ADIABATIC CROSSED-FIELD GUN.
AD-278 114 DIV. 8

A REVIEW OF THE RESEARCH PROJECTS CONDUCTED WITHIN THE ELECTRONICS RESEARCH LABORATORY. CIRCUITS, COMPUTER THEORY AND PROGRAMMING, ELECTRON STREAMS AND INTERACTIONS, PLASMAS, RADIATION AND PROPAGATION, SOLID-STATE ELECTRONICS, SYSTEMS, MISCELLANEOUS.
AD-278 395 DIV. 8

***ELECTRON GUNS**

A STUDY WAS INITIATED ON ELECTRON FOCUSING BY NON-LINEAR SPIRALS. A FLOOD-GUN SYSTEM WAS DEVELOPED FOR THE TESTING OF EXPERIMENTAL GUN STRUCTURES FOR IMAGE TUBES. DIODE-TYPE AND TRIODE-TYPE FIELD LENSES WERE STUDIED FOR AN ELECTROSTATIC IMAGE TUBE.
AD-278 094 DIV. 8

EXPERIMENTS WITH A NEW TYPE ADIABATIC CROSSED-FIELD GUN.
AD-278 114 DIV. 8

***ELECTRON TRANSITIONS**

PROBABILITIES OF OPTICAL TRANSITIONS FOR ATOMS AND DIATOMIC MOLECULES.
AD-278 085 DIV. 25

***ELECTRON TUBES**

A FEASIBILITY STUDY WAS MADE OF HIGH INTENSITY FLASH X-RAY SOURCES WHICH WOULD USE THERMIONIC AND FIELD (TF) EMISSION OF ELECTRONS. DEVELOPMENT OF A MULTICHANNEL PULSED X-RAY SYSTEM WITH TF TUBES CAPABLE OF HIGH INTENSITY FLASHES IS DESCRIBED.
AD-278 061 DIV. 24

INVESTIGATION AND STUDY OF THE OCCURRENCE OF THIN FILMS AND THEIR EFFECTS ON ELECTRON TUBE OPERATION. STATISTICAL ANALYSIS OF DATA FROM THE RANDOM BALANCE EXPERIMENT.
AD-278 095 DIV. 8

***ELECTRONIC CIRCUITS**

FOURPOLE PARAMETRIC CHARACTERIZATION OF INTEGRATED CIRCUITS. A TRANSISTOR AMPLIFIER OPERATING AS AN ENTITY RATHER THAN AS A TRANSISTOR IN COMBINATION WITH RELATED PASSIVE CIRCUIT ELEMENTS IS DISCUSSED.
AD-278 370 DIV. 8

***ELECTRONIC EQUIPMENT**
WELDING

TESTS TO DETERMINE THE RELIABILITY OF WELDED ELECTRONIC CONNECTIONS ARE REPORTED. THE MATERIALS INVOLVED NI RIBBON WELDED TO #24 BUSS WIRE, NI STRAP TO KOVAR TRANSISTOR WELDS, NI RIBBON TO 1/4 WATT RESISTOR LEADS. NO FAILURES OR GROSS JOINT DETERIORATION OCCURRED.
AD-278 350 DIV. 8

***ELECTRONICS**

A REVIEW OF THE RESEARCH PROJECTS CONDUCTED WITHIN THE ELECTRONICS RESEARCH LABORATORY, CIRCUITS, COMPUTER THEORY AND PROGRAMMING, ELECTRON STREAMS AND INTERACTIONS, PLASMAS, RADIATION AND PROPAGATION, SOLID-STATE ELECTRONICS, SYSTEMS, MISCELLANEOUS.
AD-278 395 DIV. 8

***ELECTRONS**

ELECTRON SCATTERING BY ATOMIC HYDROGEN IN THE 1S, 2S OR 2P STATE.
AD-278 019 DIV. 25

CYCLOTRON RESONANCE AND MAGNETO-OPTICAL EFFECTS IN SEMICONDUCTORS ARE DISCUSSED.
AD-278 081 DIV. 25

THE ELECTRON EXCHANGE BETWEEN THE VARIOUS SUBSTITUENT GROUPS OF ORGANOSILICON RADICALS WAS INVESTIGATED. ELECTRON SPIN RESONANCE SPECTRA OF THE NEGATIVE IONS OF 4-DIPHENYL-TRIPHENYLSILANE, DI-(4-BIPHENYL)DIPHENYLSILANE, TETRAPHENYLSILANE, TETRA-4-BIPHENYLSILANE WERE OBTAINED.
AD-278 252 DIV. 4

***ELECTROSTATIC GENERATOR**

ELECTROSTATIC SHIELDING AS A MEANS OF PROTECTING MANNED SPACE VEHICLES AGAINST SOLAR COSMIC RAYS IS DISCUSSED.
AD-277 955 DIV. 12

***ELECTROSTATICS**

ELECTROSTATIC SHIELDING AS A MEANS OF PROTECTING MANNED SPACE VEHICLES AGAINST SOLAR COSMIC RAYS IS DISCUSSED.
AD-277 955 DIV. 12

***ENAMEL COATINGS**

VITREOUS AND NON-VITREOUS PHOSPHATE BONDED MATERIALS WERE DEVELOPED FOR HIGH TEMPERATURE COATINGS. THE VITREOUS COATINGS HAD EXCELLENT THERMAL SHOCK RESISTANCE AND THE PHOSPHATE BONDED SYSTEMS WITHSTOOD TEMPERATURES BEYOND THE LIMIT O INCONEL A.
AD-278 103 DIV. 14

***EPOXY RESINS**

RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES. MODIFICATION OF THE RESINS BY LOWERING THEIR FLUID PHASE. LITERATURE REVIEW ON THE FORMATION OF UNSATURATED COMPOUNDS BASED ON METALLORGANIC MATERIALS AND THEIR POLYMERS.
AD-278 047 DIV. 14

***ERRORS**

LINEAR ERROR ANALYSIS OF A DIFFERENTIAL CORRECTION PROCEDURE USED FOR ASTRODYNAMICAL DATA REDUCTION. DEFINITION AND DEVELOPMENT OF THE CLASS OF GENERALIZED LEAST SQUARES ESTIMATORS. RIGOROUS LEAST SQUARES AND UNWEIGHTED LEAST SQUARES ESTIMATORS AS SPECIAL CASES.
AD-278 266 DIV. 2

***ETHANES**

RELATIVE EFFECTS OF MOLECULAR ASYMMETRY AND DIFFERENCES IN CONFORMATIONAL POPULATIONS CAUSING NUCLEI TO BE MAGNETICALLY NON-EQUIVALENT. NUCLEAR MAGNETIC RESONANCE SPLITTINGS DUE TO MOLECULAR ASYMMETRY.
AD-278 000 DIV. 4

***ETHERS**

PROPERTIES OF ANHYDROUS NITRATES OF TRANSITION ELEMENTS: REACTIONS OF ANHYDROUS CU(NO3)2 WITH ETHERS ARE EXPLAINED TENTATIVELY. AN ACCOUNT IS GIVEN OF REACTION PRODUCTS BETWEEN BASIC ZN ACETATE AND N2O4. CRYSTALLOGRAPHIC STUDIES CONCENTRATED ON CU(NO3)2-NITROMETHANE ADDUCT AND BASIC BERYLLIUM NITRATES.
AD-278 357 DIV. 4

***EXPLOSIONS**

TRANSLATION OF CHAPTER 10 ON "COMBUSTION OF EXPLOSIVES" FROM THE RUSSIAN TREATISE "PHYSICS OF EXPLOSION", BY F. A. BAUM, K. P. STANYUKOVICH AND B. I. SHEKHTER, PUBLISHED IN MOSCOW, 1959.
AD-278 133 DIV. 22

***EXPLOSIVES**
COMBUSTION

TRANSLATION OF CHAPTER 10 ON "COMBUSTION OF EXPLOSIVES" FROM THE RUSSIAN TREATISE "PHYSICS OF EXPLOSION", BY F. A. BAUM, K. P. STANYUKOVICH AND B. I. SHEKHTER, PUBLISHED IN MOSCOW, 1959.
AD-278 133 DIV. 22

***FAILURE (MECHANICS)**
PROBABILITY

NUMERICAL EVALUATIONS OF VARIOUS STRESS LEVELS AND INSPECTION PERIODS OF AIRCRAFT. APPROPRIATE INSPECTION PERIODS WERE DETERMINED AND COMPARED WITH CRACK PROPAGATION TIME TO FINAL FAILURE.
AD-278 171 DIV. 17

***FATIGUE (MECHANICS)**

ALUMINUM ALLOY FATIGUE INFORMATION OBTAINED FROM SOURCES OF PUBLISHED AND UNPUBLISHED TEST REPORTS IS PRESENTED. THE INFORMATION WAS PROCESSED THROUGH A SEMI-AUTOMATIC DATA PROCESSING SYSTEM AND APPEARS IN GRAPHICAL FORM.
AD-278 359 DIV. 17

***FATIGUE (MECHANICS)**
MATHEMATICAL PREDICTION

SONIC FATIGUE LIFE DETERMINATION OF AIRFRAME STRUCTURES BY SIREN TESTING.
AD-278 173 DIV. 1

***FIELD EMISSION**

FIELD EMISSION MICROSCOPE PATTERNS WERE OBTAINED FROM 35 ATOM A RE-MO ALLOY, SHOWING A BCC LATTICE, AND OF MORE THAN 50 ATOM A ALLOY, SHOWING A SIGMA PHASE. FIELD INDUCED REACTIONS BETWEEN O2 MO OR PT WITH CO AND N WERE OBSERVED.
AD-278 246 DIV. 25

***FILAMENT WOUND CONSTRUCTION**

A TELEVISION X-RAY IMAGING SYSTEM FOR THE NON-DESTRUCTIVE INSPECTION OF FIBER GLASS-REINFORCED PLASTIC MISSILE CASE WALLS AND MATERIALS IS DISCUSSED. MATERIALS AND DESIGN OF THE VIDICON SENSING TUBE ARE EVALUATED.
AD-278 120 DIV. 8

STRENGTH AND MODULUS OF CONTINUOUS FILAMENT WOUND CYLINDRICAL STRUCTURES THROUGH QUALITY CONTROL: THE BODIES INCLUDED PARALLEL FILAMENT WOUND 1-IN.-DIAM HOOPS OF GLASS CONTENT BETWEEN 65 VOL-% AND 87-% AND 78 VOL-% AND 87-%. MECHANISM OF FAILURE IN FLEXURE WAS IN THE NON-GLASS REGION.
AD-278 121 DIV. 14

THE DEVELOPMENT OF A TELEVISION X-RAY IMAGING SYSTEM FOR THE NONDESTRUCTIVE INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASE MATERIALS IS DISCUSSED. AN X-RAY-SENSING BE WINDOW TUBE WAS FABRICATED WHICH APPEARS TO HAVE OVERCOME PROBLEMS OF TARGET POISONING AND DETERIORATION.
AD-278 247 DIV. 14

***FIRING ERROR INDICATORS**

A GUIDED MISSILE MISS-DISTANCE INDICATOR.
AD-278 076 DIV. 8

***FLAMES**
INHIBITION

FLAME INHIBITION RESEARCH STUDIES UTILIZING H2-O2, CO-O2, CH4-O2, C2H4-O2 WITH HBR-DBR, BR2, HI, HCL, CF3-CL, CF3BR, CDR4 AS INHIBITORS. HANDLING AND METERING CORROSIVE MATERIALS AND STUDIES ON ATOM CONCENTRATION IN SCAVENGER PROBES AND IN SPHERICAL METHANE FLAMES ARE REPORTED.
AD-278 058 DIV. 10

***FLASH LAMPS**

A FEASIBILITY STUDY WAS MADE OF HIGH INTENSITY FLASH X-RAY SOURCES WHICH WOULD USE THERMIONIC AND FIELD (TF) EMISSION OF ELECTRONS. DEVELOPMENT OF A MULTICHANNEL PULSED X-RAY SYSTEM WITH TF TUBES CAPABLE OF HIGH INTENSITY FLASHES IS DESCRIBED.
AD-278 061 DIV. 24

***FLASH RADIOGRAPHY**

A FEASIBILITY STUDY WAS MADE OF HIGH INTENSITY FLASH X-RAY SOURCES WHICH WOULD USE THERMIONIC AND FIELD (TF) EMISSION OF ELECTRONS. DEVELOPMENT OF A MULTICHANNEL PULSED X-RAY SYSTEM WITH TF TUBES CAPABLE OF HIGH INTENSITY FLASHES IS DESCRIBED.
AD-278 061 DIV. 24

***FLUID FLOW**

MAGNETOHYDRODYNAMIC FLOW PAST A THIN AIRFOIL.
AD-278 239 DIV. 9

THE FLOW PATTERN WHICH RESULTS WHEN A STATIONARY SOUND FIELD IS CREATED OUTSIDE AN INFINITE PLANE WALL THROUGH WHICH A FLUID IS SLOWLY DISCHARGED IS DISCUSSED.
AD-278 373 DIV. 25

***FLUID FLOW**
MATHEMATICAL ANALYSIS

THREE-DIMENSIONAL EFFECTS IN VISCOUS WAKES.
AD-278 129 DIV. 9

***FLUORESCENT DYES**

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 350 DIV. 3

***CYCLOTRON MAGNETS**

A TRANSISTORIZED GENERATOR VOLTAGE CONTROL FOR A CYCLOTRON MAGNET.
AD-278 212 DIV. 8

***CYCLOTRONS**

HIGH ENERGY PLASMA GENERATION AND CONTROL.
AD-278 153 DIV. 25

***CYLINDRICAL BODIES**

THE RESPONSE OF UNDERGROUND CYLINDRICAL TUNNEL AND SILO LININGS TO BLAST-INDUCED LOADINGS. A THEORETICAL METHOD FOR ESTIMATING GROUND SHOCK.
AD-278 063 DIV. 13

THE FLOW PATTERN WHICH RESULTS WHEN A STATIONARY SOUND FIELD IS CREATED OUTSIDE AN INFINITE PLANE WALL THROUGH WHICH A FLUID IS SLOWLY DISCHARGED IS DISCUSSED.
AD-278 373 DIV. 25

***CYLINDRICAL BODIES**
FILAMENT WOUND CONSTRUCTION

STRENGTH AND MODULUS OF CONTINUOUS FILAMENT WOUND CYLINDRICAL STRUCTURES THROUGH QUALITY CONTROL. THE BODIES INCLUDED PARALLEL FILAMENT WOUND 18-IN.-DIAM HOOPS OF GLASS CONTENT BETWEEN 65 VOL-% AND 80 WT-% AND 78 VOL-% AND 88 WT-%. MECHANISM OF FAILURE IN FLEXURE WAS IN THE NON-GLASS REGION.
AD-278 121 DIV. 14

***DAMPING**

SOUNDAMP TYPE RAL (RUBBER-AIR-LEAD) WAS EVALUATED FOR DAMPING VIBRATION IN STEEL PLATES. FREQUENCIES WHERE PERCENTAGE CRITICAL DAMPING WAS 3% OR HIGHER WERE 1 TO 8.9 KCPS AT 30 F, 0.8 TO 6.1 KCPS AT 40 F, BELOW 0.8 TO 4.7 KCPS AT 74 F, AND BELOW 0.8 TO 3.8 KCPS AT 90 F.
AD-278 297 DIV. 14

***DATA PROCESSING SYSTEMS**

THE PROCEDURES REQUIRED IN THE APPLICATION OF LINEAR OPERATOR THEORY TO ONE ASPECT OF SYSTEMS ANALYSIS, WHICH IS THE TREATMENT OF EXPERIMENTAL OR DATA PROCESSING.
AD-278 143 DIV. 30

***DATA TRANSMISSION SYSTEMS**

ENGINEERING DESIGN INVESTIGATION OF FAA CENTER-TO-TOWER RADAR MANUAL-OFF DATA LINK AND PPI ADAPTATION EQUIPMENT IS REPORTED.
AD-278 082 DIV. 19

ANTENNA AND SYSTEM TECHNIQUES FOR SHF COMMUNICATIONS LINK.
AD-278 154 DIV. 5

***DECABORANES**

THE SYNTHESIS AND CHEMISTRY OF B POLYMERS INVOLVING PENTABORANES, DECABORANES, B10H9 AND B10H12 LIGAND COMPOUNDS, ARE DISCUSSED. THIS RESEARCH IS AIMED AT THE PRODUCTION OF MATERIALS STABLE TO HEATING AT OR ABOVE 1000 F.
AD-278 056 DIV. 4

CU2B10H10 STRUCTURE: X-RAY DIFFRACTION STUDY CONFIRMED THE D SUB 4D SYMMETRY FOR THE B10H10(--) ION AND ESTABLISHED THE COVALENT NATURE OF THE INTERACTIONS OF CU SUPERSCRIPT I B ATOMS FORMING THE EDGES OF THE POLYHEDRON.
AD-278 206 DIV. 4

***DEFORMATION**

SPECIMENS OF ELECTRON BEAM ZONE-REFINED NB WERE SUBJECTED TO TENSILE TESTS BETWEEN 373 AND 4.2 K. POLYCRYSTALLINE AND SINGLE CRYSTALS WERE TESTED. SPECIMENS WERE EITHER DEFORMED TO FRACTURE OR THE TEMPERATURE WAS CHANGED TO MEASURE REVERSIBLE FLOW STRESS.
AD-278 091 DIV. 17

***DESIGN**

PROPERTIES OF LASER DEVICES.
AD-278 053 DIV. 25

***DESTROYERS**
NETHERLANDS

A COMPARISON OF THEORY AND EXPERIMENT FOR SLAMMING (HYDRODYNAMIC FORCES) WAS MADE ON A DUTCH DESTROYER.
AD-278 386 DIV. 31

***DETECTION**

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 350 DIV. 3

***DETONATION**

ON THE EXPANSION OF SHOCK WAVES AROUND A DETONATING EXPLOSIVE BODY.
AD-278 084 DIV. 22

***DETONATORS**

XM34, XM35, AND XM47 MINIATURE INITIATORS: DESIGN; TESTS.
AD-278 054 DIV. 22

***DIFFERENTIAL EQUATIONS**

NOTE ON SCALING FIRST-ORDER DIFFERENTIAL EQUATIONS FOR AN ANALOG COMPUTER.
AD-278 077 DIV. 15

THE PROCEDURES REQUIRED IN THE APPLICATION OF LINEAR OPERATOR THEORY TO ONE ASPECT OF SYSTEMS ANALYSIS, WHICH IS THE TREATMENT OF EXPERIMENTAL OR DATA PROCESSING.
AD-278 143 DIV. 30

***DIFFUSION**
METALS

GRAIN-BOUNDARY DIFFUSION STUDIES OF AU IN CU WERE STUDIED FOR COUPLES OF BOTH A CONTINUOUS AND AN INSTANTANEOUS SOURCE. THE GRAIN-BOUNDARY DIFFUSION COEFFICIENT DECREASES WITH INCREASING SOLUTE CONCENTRATION WHERE THE LATTICE DIFFUSION EITHER INCREASES OR DECREASES RELATIVE TO THE SOLVENT.
AD-278 377 DIV. 25

***DIGITAL COMPUTERS**

A REVIEW OF THE RESEARCH PROJECTS CONDUCTED WITHIN THE ELECTRONICS RESEARCH LABORATORY. CIRCUITS; COMPUTER THEORY AND PROGRAMMING; ELECTRON STREAMS AND INTERACTIONS; PLASMAS; RADIATION AND PROPAGATION; SOLID-STATE ELECTRONICS; SYSTEMS; MISCELLANEOUS.
AD-278 395 DIV. 8

***DIODES**

DESIGN, PRODUCTION, AND TESTS OF HIGH VOLTAGE SILICON RECTIFIER STACKS.
AD-278 107 DIV. 8

***DIODES**
SEMICONDUCTORS

RESEARCH STUDIES INCLUDED THE USE OF SPECTRALLY SELECTIVE SURFACES AS SOLAR ABSORBERS; THE USE OF SPECTRALLY SELECTIVE SURFACES IN THERMIONIC DIODES; AND THE RADIATIVE CHARACTERISTICS OF PHOSPHOR MATERIALS.
AD-277 985 DIV. 8

***DISPLAY SYSTEMS**

RESEARCH WAS CONDUCTED ON A HIGH SPEED, RUGGEDIZED, MINIATURE, DIGITAL VOLTMETER UTILIZING THE FIELD EFFECT TECHNIQUE TO ACCOMPLISH ANALOG TO DIGITAL CONVERSION.
AD-278 067 DIV. 30

***DOCUMENTATION**
INFORMATION RETRIEVAL

FIRST REVISION OF THESAURUS OF ASTIA DESCRIPTORS. DISCUSSION OF OBJECTIVES AND GENERAL APPROACH USED IN THE PREPARATION OF THE FORTHCOMING SECOND EDITION OF THE THESAURUS OF ASTIA DESCRIPTORS.
AD-278 168 DIV. 32

***DROPS**

A NEW METHOD IS PRESENTED FOR HIGH SPEED MOTION-PICTURE PHOTOGRAPHY OF MOVING TRANSPARENT DROPS.
AD-278 062 DIV. 24

***DUCTS**

GAMMA DOSE RATES AND ENERGY SPECTRA IN A 3-FOOT SQUARE DUCT.
AD-278 119 DIV. 20

***DUCTS**
FLUID FLOW

COMPRESSIBLE VISCOUS FLOW IN A TWO-DIMENSIONAL ADIABATIC CHANNEL.
AD-278 128 DIV. 9

***DYES**

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 350 DIV. 3

***EARTH**

THEORETICAL STUDY OF GROUND MOTION PRODUCED BY NUCLEAR BLASTS.
AD-278 170 DIV. 25

***ECONOMIC CONDITIONS**

A TWO SECTOR MODEL OF GROWTH IS DISCUSSED.
AD-278 381 DIV. 32

***ECONOMICS**

A TWO SECTOR MODEL OF GROWTH IS DISCUSSED.
AD-278 381 DIV. 32

***ELASTIC SCATTERING**

ELECTRON SCATTERING BY ATOMIC HYDROGEN IN THE 1S, 2S OR 2P STATE.
AD-278 019 DIV. 25

***ELASTIC SHELLS**
MATHEMATICAL ANALYSIS

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AD-278 136 DIV. 25

***ELASTICITY**

HYDROELASTIC EFFECTS ON THE LIFT OF HIGH-SPEED HYDROFOILS.
AD-278 097 DIV. 9

THE WEIGHT OF A REDUNDANT, PIN-JOINTED, PLANAR TRUSS OF A GIVEN OUTLINE WHICH SUPPORTS ALTERNATIVE LOADINGS IS DISCUSSED.
AD-278 293 DIV. 25

THE ISOTHERMAL QUASI-STATIC LINEAR THEORY OF HOMOGENEOUS AND ISOTROPIC VISCOELASTIC SOLIDS IS DISCUSSED.
AD-278 376 DIV. 9

***ELASTOMERS**
SEALS

A VITON B STOCK (377-122) WAS TESTED FOR USE AS AN ELASTOMERIC SEAL MATERIAL FOR 5200 PSI AIR SYSTEMS. DYNAMIC AND STATIC TESTS OF 377-122 O-RINGS LUBRICATED WITH DRY MOS2 VERIFIED THE SUITABILITY OF THE STOCK AND THE MOS2 LUBRICANT.
AD-278 271 DIV. 14

***ELECTRIC DETONATORS**

VACUUM DEPOSITED THERMOCOUPLE DEVELOPMENT AND INSTRUMENTED ELECTRO-EXPLOSIVE DEVICE CHARACTERISTICS.
AD-278 384 DIV. 22

***ELECTRIC DETONATORS**
TEST METHODS

RADIOFREQUENCY TESTING AND MISCELLANEOUS METHODS LEADING TO PERFECTION OF INSTRUMENTATION OF ELECTRO-EXPLOSIVE DEVICES.
AD-278 385 DIV. 22

***ELECTRIC FIELDS**

A STUDY IS MADE OF MAGNETOGASDYNAMIC SOURCE FLOW WITH CROSSED ELECTRIC AND MAGNETIC FIELDS.
AD-278 073 DIV. 9

***ELECTRIC IGNITERS**
TEST METHODS

RADIOFREQUENCY TESTING AND MISCELLANEOUS METHODS LEADING TO PERFECTION OF INSTRUMENTATION OF ELECTRO-EXPLOSIVE DEVICES.
AD-278 385 DIV. 22

***ELECTRIC POWER PRODUCTION**
ANALYSIS

STUDY OF SPACE-VEHICLE ELECTRIC POWER PRODUCTION AND UTILIZATION.
AD-278 204 DIV. 12

***ELECTRICAL NETWORKS**

EQUIVALENCE OF NON-RECIPROCAL ACTIVE AND PASSIVE NETWORKS. THE MATHEMATICAL BACKGROUND OF THE CONGRUENCE TRANSFORMATION AS APPLIED TO THE THEORY OF EQUIVALENT NETWORKS IS DEVELOPED.
AD-278 184 DIV. 8

***ELECTRODES**
ELECTROLYSIS

ELECTRICAL BEHAVIOR OF PASSIVE IRON AND NICKEL WAS STUDIED. IRON MAY BE MADE PASSIVE BY MAKING IT AN ANODE IN AN ACID SOLUTION AND PASSING A HIGH CURRENT THROUGH THE CELL. THE NICKEL SYSTEM CAN BE CYCLED; PASSIVATED READILY; AND RECLEANED.
AD-278 213 DIV. 25

ANIMALS. ESTABLISHMENT OF ASELINE STANDARDS THROUGH THE STUDY OF VALUES OBTAINED FROM THE INVESTIGATION OF SOME OF THE HEMATOLOGICAL ELEMENTS ASSOCIATED WITH THE PHYSIOLOGY OF LABORATORY ANIMALS; USING SEMIMICROTECHNIQUES; ULTRAMICROTECHNIQUES; AND ELECTROMEUICAL TECHNIQUES.
AD-278 368 DIV. 16

*HEMISPHERICAL SHELLS

TESTS OF MACHINED DEEP SPHERICAL SHELLS UNDER EXTERNAL HYDROSTATIC PRESSURE.
AD-278 079 DIV. 9

*HEMOPOIESIS

EXPOSURE OF RATS TO MINIMAL DOSES OF MICROWAVE RADIATION (24,000 MEGACYCLES) INDUCED HEMATOPOIETIC EFFECTS OF LEUKOCYTOSIS, LYMPHOCYTOSIS, AND NEUTROPHILIA.
AD-278 022 DIV. 16

*HIGH INTENSITY FLASH LAMPS
DESIGN

A FEASIBILITY STUDY WAS MADE OF HIGH INTENSITY FLASH X-RAY SOURCES WHICH WOULD USE THERMIONIC AND FIELD (TF) EMISSION OF ELECTRONS. DEVELOPMENT OF A MULTICHANNEL PULSED X-RAY SYSTEM WITH TF TUBES CAPABLE OF HIGH INTENSITY FLASHES IS DESCRIBED.
AD-278 061 DIV. 24

*HIGH PRESSURE COMPRESSORS

A VITON B STOCK (377-122) WAS TESTED FOR USE AS AN ELASTOMERIC SEAL MATERIAL FOR 5200 PSI AIR SYSTEMS. DYNAMIC AND STATIC TESTS OF 377-122 O-RINGS LUBRICATED WITH DRY MOS2 VERIFIED THE SUITABILITY OF THE STOCK AND THE MOS2 LUBRICANT.
AD-278 271 DIV. 14

*HIGH SPEED PHOTOGRAPHY

A NEW METHOD IS PRESENTED FOR HIGH SPEED MOTION-PICTURE PHOTOGRAPHY OF MOVING TRANSPARENT DROPS.
AD-278 062 DIV. 24

*HIGH TEMPERATURE RESEARCH

A DEVICE FOR TAKING SINGLE CRYSTAL X-RAY PHOTOGRAPHS AT TEMPERATURES UP TO 1000 C.
AD-278 071 DIV. 25

THE PRESENT STATUS OF KNOWLEDGE OF HIGH-TEMPERATURE TRANSPORT COEFFICIENTS OF AIR, AIR CONSTITUENTS, AND THE RARE GASES IS REVIEWED.
AD-278 149 DIV. 9

*HYDROCARBONS

PROMISING HYDROCARBON FUELS FOR AIR FORCE REQUIREMENTS ARE ALKYL-SUBSTITUTED MONOCYCLICS AN BICYCLICS FOR HIGH TEMPERATURE; ISOPARAFFIN AND TRICYCLIC STRUCTURES FOR SPECIALIZED FUELS; BICYCLICS AND VAPOR FUELS FOR FLIGHT BEYOND MACH 5; AND ENDOTHERMIC FUEL BEYOND MACH 5.
AD-277 953 DIV. 10

*HYDRODYNAMICS

A COMPARISON OF THEORY AND EXPERIMENT FOR SLAMMING (HYDRODYNAMIC FORCES) WAS MADE ON A DUTCH DESTROYER.
AD-278 386 DIV. 31

*HYDROFOIL BOATS

MODEL TESTS OF A 300-TON 50-KNOT HYDROFOILCRAFT. THE HYDROFOILCRAFT WAS TESTED IN STILL WATER AND IN REGULAR WAVES FOR PITCH AND HEAVE CHARACTERISTICS.
AD-278 224 DIV. 31

*HYDROFOILS

HYDROELASTIC EFFECTS ON THE LIFT OF HIGH-SPEED HYDROFOILS.
AD-278 097 DIV. 9

MODEL TESTS OF A 300-TON 50-KNOT HYDROFOILCRAFT. THE HYDROFOILCRAFT WAS TESTED IN STILL WATER AND IN REGULAR WAVES FOR PITCH AND HEAVE CHARACTERISTICS.
AD-278 224 DIV. 31

*HYDROGEN

ELECTRON SCATTERING BY ATOMIC HYDROGEN IN THE 1S, 2S OR 2P STATE.
AD-278 019 DIV. 25

*HYPERFINE STRUCTURE

THE ESR SPECTRUM AND SPIN DENSITIES FOR THE BIQUATERNARY BIPYRIDYL RADICAL CATION ARE DISCUSSED.
AD-277 998 DIV. 25

*HYPERSONIC FLOW

THE EXPERIMENTAL APPLICATION OF SONIC-PNEUMATIC PROBE SYSTEMS TO TEMPERATURE MEASUREMENT IN A HYPERSONIC AIRSTREAM.
AD-278 366 DIV. 9

*HYPERSONIC WIND TUNNELS

ESTIMATED PERFORMANCE AT A HYPERSONIC WIND TUNNEL (NOZZLE EXIT DIAMETER IS 30 INCHES) INCLUDING CURVES OF REYNOLD'S NUMBERS, SUPERSATURATION, MASS FLOW RATES, SHOCK RECOVERY, RUNNING TIMES, AND VACUUM SYSTEM CHARACTERISTICS.
AD-277 952 DIV. 1

THE DEVELOPMENT AND OPERATION OF A 5 X 10 TO THE 6TH POWER JOULE, INDUCTION-STORAGE POWER SUPPLY FOR A HOTSHOT TYPE WIND TUNNEL IS PRESENTED ALONG WITH A DISCUSSION OF THE EQUIPMENT AND ITS AUXILIARIES.
AD-278 158 DIV. 30

*HYPERSONICS
MATHEMATICAL ANALYSIS

CONICAL FLOW PARAMETERS FOR AIR AND NITROGEN IN VIBRATIONAL EQUILIBRIUM.
AD-278 178 DIV. 9

*HYPERVELOCITY VEHICLES
DECELERATION

ANALYTICAL SOLUTIONS FOR A TYPE OF VARIABLE-LIFT MODULATION APPLICABLE TO A LIFTING BODY ENTERING THE ATMOSPHERE FROM SUPERORBITAL AND ORBITAL SPEEDS.
AD-278 181 DIV. 12

*IGNITION

TECHNICAL RECOMMENDATIONS FOR THE IGNITION RESEARCH PROGRAM OF THE BUREAU OF NAVAL WEAPONS.
AD-278 273 DIV. 27

*IMAGE TUBES

A STUDY WAS INITIATED ON ELECTRON FOCUSING BY NON-LINEAR SPIRALS. A FLOOD-GUN SYSTEM WAS DEVELOPED FOR THE TESTING OF EXPERIMENTAL GUN STRUCTURES FOR IMAGE TUBES. DIODE-TYPE AND TRIODE-TYPE FIELD LENSES WERE STUDIED FOR AN ELECTROSTATIC IMAGE TUBE.
AD-278 094 DIV. 8

A TELEVISION X-RAY IMAGING SYSTEM FOR THE NONDESTRUCTIVE INSPECTION OF FIBER GLASS-REINFORCED PLASTIC MISSILE CASE WALLS AND MATERIALS IS DISCUSSED. MATERIALS AND DESIGN OF THE VIDICON SENSING TUBE ARE EVALUATED.
AD-278 120 DIV. 8

THE DEVELOPMENT OF A TELEVISION X-RAY IMAGING SYSTEM FOR THE NONDESTRUCTIVE INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASE MATERIALS IS DISCUSSED. AN X-RAY-SENSING SE WINDOW TUBE WAS FABRICATED WHICH APPEARS TO HAVE OVERCOME PROBLEMS OF TARGET POISONING AND DETERIORATION.
AD-278 247 DIV. 24

*IMPACT SHOCK

A COMPARISON OF THEORY AND EXPERIMENT FOR SLAMMING (HYDRODYNAMIC FORCES) WAS MADE ON A DUTCH DESTROYER.
AD-278 386 DIV. 31

*INDEXES

ABSTRACTS FROM UNCLASSIFIED LITERATURE PRESENTED ON SUBJECT OF FLIGHT VEHICLE POWER AND REFERENCES IN THE FIELDS OF MATERIALS.
AD-278 130 DIV. 7

FIRST REVISION OF THESAURUS OF ASTIA DESCRIPTORS. DISCUSSION OF OBJECTIVES AND GENERAL APPROACH USED IN THE PREPARATION OF THE FORTHCOMING SECOND EDITION OF THE THESAURUS OF ASTIA DESCRIPTORS.
AD-278 168 DIV. 32

*INDIUM ALLOYS

THE PROPERTIES OF INJECTED ELECTRON-HOLE PLASMAS IN INDIUM ANTIMONIDE WERE INVESTIGATED AS A FUNCTION OF CURRENT, ELECTRIC FIELD STRENGTH, AND LONGITUDINAL MAGNETIC FIELD.
AD-278 375 DIV. 25

*INDOLES

CHEMICAL APPROACHES TO THE SOLUTION OF STRUCTURES OF YOHIMBINE AND STRYCHNINE BY DEGRADATION TO PRODUCTS OF KNOWN STEREOCHEMISTRY ARE DISCUSSED. THE SYNTHESES OF FLAVOPEREIRINE AND ERYTHROCENTAURIN ARE DESCRIBED.
AD-278 106 DIV. 4

*INDUCTION SYSTEMS

THE DEVELOPMENT AND OPERATION OF A 5 X 10 TO THE 6TH POWER JOULE, INDUCTION-STORAGE POWER SUPPLY FOR A HOTSHOT TYPE WIND TUNNEL IS PRESENTED ALONG WITH A DISCUSSION OF THE EQUIPMENT AND ITS AUXILIARIES.
AD-278 158 DIV. 30

*INELASTIC SCATTERING

ELECTRON SCATTERING BY ATOMIC HYDROGEN IN THE 1S, 2S OR 2P STATE.
AD-278 019 DIV. 25

*INEQUALITIES

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*INFORMATION THEORY

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AD-278 139 DIV. 8

*INFRARED FILTERS

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AD-278 115 DIV. 25

*INFRARED OPTICAL MATERIALS

RESEARCH STUDIES INCLUDED THE USE OF SPECTRALLY SELECTIVE SURFACES AS SOLAR ABSORBERS; THE USE OF SPECTRALLY SELECTIVE SURFACES IN THERMIONIC DIODES; AND THE RADIATIVE CHARACTERISTICS OF PHOSPHOR MATERIALS.
AD-277 985 DIV. 8

*INFRARED RADIATION

MEASUREMENT OF TEMPERATURES IN IONIZED GASES BY MEANS OF INFRARED RADIATION (1) INFRARED RADIATION AND TEMPERATURES OF PLASMAJETS (2) MEASUREMENT OF GAS TEMPERATURES IN THERMAL PULSES BY MONOCHROMATIC RADIATION PYROMETRY.
AD-278 045 DIV. 25

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AD-278 225 DIV. 2

*INFRARED RADIATION
ATMOSPHERE

USE, CALIBRATION, AND DESIGN OF A GRATING SPECTROMETER AND AN ACTINUGRAPH WITH INTERFERENCE FILTERS TO INVESTIGATE INFRARED SKY RADIATION IN DEPENDENCE OF DIFFERENT METEOROLOGICAL CONDITIONS.
AD-278 115 DIV. 25

*INFRARED RESEARCH

USE, CALIBRATION, AND DESIGN OF A GRATING SPECTROMETER AND AN ACTINUGRAPH WITH INTERFERENCE FILTERS TO INVESTIGATE INFRARED SKY RADIATION IN DEPENDENCE OF DIFFERENT METEOROLOGICAL CONDITIONS.
AD-278 115 DIV. 25

*INFRARED SPECTROSCOPY

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AD-278 108 DIV. 25

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AD-278 221 DIV. 25

*INTEGRATION

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AD-278 236 DIV. 15

*INTERMETALLIC COMPOUNDS

THE PROPERTIES OF INJECTED ELECTRON-HOLE

***FLUTTER**

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AD-278 239 DIV. 9

***FOOD PRESERVATION**

TO DETERMINE THE EFFECTS OF RADIATION AS A FOOD PRESERVATION. PACKAGED DRIED FRUITS AND VEGETABLES WERE SUBJECTED TO 0.1 TO 2.0 MRAD DOSES. RADIATION DOSES OF 0.5 MRADS OR LESS HAD HIGHER ACCEPTABILITY. THE 1.0 MRAD DOSE INDUCED DISCOLORATION. TENDERNESS MEASURED BY SHEAR PRESS METHOD.
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AD-277 981 DIV. 8

***FUEL CELLS ELECTROCHEMISTRY**

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***FUNCTIONS**

RESEARCH ON INTERPOLATION PROBLEMS BY BOUNDED ANALYTIC FUNCTIONS.
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***GADOLINIUM COMPOUNDS**

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS; CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES; ELECTRICAL AND PHYSICAL PROPERTIES.
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***GAS DIFFUSION**

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***GAS DISCHARGES**

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AD-278 073 DIV. 9

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AD-278 140 DIV. 9

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AD-278 220 DIV. 9

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THE DEVELOPMENT AND OPERATION OF A 5 X 10 TO THE 6TH POWER JOULE, INDUCTION-STORAGE POWER SUPPLY FOR A HOTSHOT TYPE WIND TUNNEL IS PRESENTED ALONG WITH A DISCUSSION OF THE EQUIPMENT AND ITS AUXILIARIES.
AD-278 158 DIV. 30

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AD-278 227 DIV. 7

***GLASS TEXTILES**

STRENGTH AND MODULUS OF CONTINUOUS FILAMENT WOUND CYLINDRICAL STRUCTURES THROUGH QUALITY CONTROL. THE BODIES INCLUDED PARALLEL FILAMENT WOUND 18-IN.-DIAM HOOPS OF GLASS CONTENT BETWEEN 65 VOL-%, 80 WT-% AND 78 VOL-%, 88 WT-%. MECHANISM OF FAILURE IN FLEXURE WAS IN THE NON-GLASS REGION.
AD-278 121 DIV. 14

TENSILE STRENGTH MEASUREMENTS WERE CONDUCTED ON COMMERCIAL E GLASS. A REFINEMENT OF TEST PROCEDURES IS SUGGESTED.
AD-278 156 DIV. 14

THE DEVELOPMENT OF A TELEVISION X-RAY IMAGING SYSTEM FOR THE NONDESTRUCTIVE INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASE MATERIALS IS DISCUSSED. AN X-RAY-SENSING VIDICON TUBE WAS FABRICATED WHICH APPEARS TO HAVE OVERCOME PROBLEMS OF TARGET POISONING AND DETERIORATION.
AD-278 247 DIV. 14

***GOLD**

GRAIN-BOUNDARY DIFFUSION STUDIES OF AU IN CU WERE STUDIED FOR COUPLES OF BOTH A CONTINUOUS AND AN INSTANTANEOUS SOURCE. THE GRAIN-BOUNDARY DIFFUSION COEFFICIENT DECREASES WITH INCREASING SOLUTE CONCENTRATION WHERE THE LATTICE DIFFUSION EITHER INCREASES OR DECREASES RELATIVE TO THE SOLVENT.
AD-278 377 DIV. 25

***GOLD ALLOYS**

MEASUREMENTS WERE MADE OF THE CONCENTRATION OF ADSORBED AU REQUIRED FOR NUCLEATION OF AG CRYSTALS TO OCCUR ON A W SUBSTRATE. EMF MEASUREMENTS WERE MADE ON AU-NI ALLOYS; TABULATED VALUES OF THE ACTIVITIES, FREE ENERGIES, ENTROPIES AND ENTHALPIES OF MIXING ARE GIVEN.
AD-278 068 DIV. 17

***GRAPHITE**

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND DIFFUSION AND SOLID-STATE BONDING. PROPERTIES RECOMMENDING REFRACTORY METALS AND GRAPHITE TO AEROSPACE APPLICATIONS ARE DISCUSSED.
AD-278 193 DIV. 8

THE UTILITY OF PYROLYTIC GRAPHITE IN SOLID ROCKET MOTORS WAS ESTABLISHED BY EROSION MEASUREMENTS. FOR PROPELLANTS WITH FLAME TEMPERATURES BETWEEN 5600 AND 6000 F, THE EROSION RATE WAS VERY LOW. WITH A 6500 F PROPELLANT, EROSION INCREASED WITH INCREASING MOTOR PRESSURE TO 0.5 MIL/SEC AT 900 PSI.
AD-278 371 DIV. 27

***GRAVITY**

THE GRAVITATIONAL FIELD OF THE EARTH ZONAL HARMONICS FROM TRANSIT 1B AND TRANSIT 2A DATA.
AD-278 238 DIV. 2

***GROUPS (MATHEMATICS)**

OPTIMUM SUBDIVISION OF A VARIABLE BY THE METHOD OF D. R. COX. THE OBJECT IS TO DIVIDE A GIVEN VARIABLE X INTO K CLASSES IN SUCH A MANNER THAT FOR STATED K THERE IS A MINIMUM LOSS OF DETAIL.
AD-278 142 DIV. 15

A NUMERICAL ESTIMATION OF THE PARTITION FUNCTION IN QUANTUM STATISTICS.
AD-278 221 DIV. 25

***GUN SIGHTS**

DESIGN OF AN ECCENTRIC COUPLING FOR INTRODUCING HORIZONTAL LEAD ANGLES FOR USE WITH M138 MACHINE GUNS AND M153 CANNONS ON HELICOPTERS.
AD-278 196 DIV. 22

***HARMONIC OSCILLATORS**

THIS ANALYSIS IS ON THE RESEARCH OF STATISTICAL MECHANICS AND THERMODYNAMICS OF IRREVERSIBLE PROCESSES.
AD-278 134 DIV. 25

***HEAT RESISTANT ALLOYS FRACTURE (MECHANICS)**

AN INVESTIGATION OF THE CRACK-PROPAGATION RESISTANCE OF HIGH-STRENGTH ALLOYS AND HEAT-RESISTANT ALLOYS. TENSILE PROPERTIES AND CRACK-PROPAGATION OF 0.050 IN.-THICK D-14 NB ALLOY SHEET WERE DETERMINED BETWEEN -300 AND 1200 F.
AD-278 043 DIV. 17

***HEAT RESISTANT POLYMERS**

RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES. MODIFICATION OF THE RESINS BY LOWERING THEIR FLUID PHASE. LITERATURE REVIEW ON THE FORMATION OF UNSATURATED COMPOUNDS BASED ON METALORGANIC MATERIALS AND THEIR POLYMERS.
AD-278 047 DIV. 14

***HEAT RESISTANT POLYMERS SYNTHESIS**

THE SYNTHESIS AND CHEMISTRY OF B POLYMERS INVOLVING PENTABORANE9, DECABORANE9, BIUNY AND BIUNIZ LIGAND COMPOUNDS, ARE DISCUSSED. THIS RESEARCH IS AIMED AT THE PRODUCTION OF MATERIALS STABLE TO HEATING AT OR ABOVE 1000 F.
AD-278 056 DIV. 4

***HEATERS**

RELIABILITITY OF MICRO-FILM CONDUCTION HEATERS AND EVALUATION OF TENSION PAD MATERIALS AND ADHESIVES AT 500 TO 600 F AND TENSILE LOAD OF 20 PSI.
AD-277 978 DIV. 30

NI LEADS, AU TABS AND A NICHROME HEATER FILM ON AN AL203 DIELECTRIC WERE FOUND COMPATIBLE FOR OPERATION AS A MICROFILM HEATER TO 1500 F.
AD-277 979 DIV. 30

***HELICOPTERS ARMAMENT**

DESIGN OF AN ECCENTRIC COUPLING FOR INTRODUCING HORIZONTAL LEAD ANGLES FOR USE WITH M138 MACHINE GUNS AND M153 CANNONS ON HELICOPTERS.
AD-278 196 DIV. 22

***HEMATOLOGY BIOCHEMICAL TESTS**

RANDOM-SEXED POPULATIONS OF SMALLEN LABORATORY

***MATHEMATICAL ANALYSIS**

THE WEIGHT OF A REDUNDANT, PIN-JOINTED, PLANAR TRUSS OF A GIVEN OUTLINE WHICH SUPPORTS ALTERNATIVE LOADINGS IS DISCUSSED.
AD-278 293 DIV. 25

***MATHEMATICAL PREDICTION**

A TWO SECTOR MODEL OF GROWTH IS DISCUSSED.
AD-278 381 DIV. 32

***MATRIX ALGEBRA**

ENCLOSURE THEOREMS FOR EIGENVALUES AND PROBABILITY INEQUALITIES.
AD-278 072 DIV. 15

APPLICATIONS OF GRAPH THEORY TO SOLUTIONS OF SOME SYSTEMS OF LINEAR ALGEBRAIC EQUATIONS.
AD-278 393 DIV. 15

***MECHANICAL DRIVES**

AN ORIENTING DEVICE FOR A FLAT-PANEL ARRAY OF SOLAR CELLS.
AD-278 209 DIV. 7

***MECHANICS**

UPPER AND LOWER BOUNDS FOR THE APSIDAL ANGLE IN THE THEORY OF THE SPHERICAL PENDULUM. A QUICK DERIVATION OF THE LOWER AND UPPER BOUNDS OF PUISEUX AND HALPHEN FOR THE APSIDAL ANGLE. SIMPLICATION THROUGH ELIMINATION OF THE NEED FOR CONTOUR INTEGRATION. DEMONSTRATION OF SHARPNESS OF THE BOUNDS.
AD-278 275 DIV. 15

***MESONS**

A COLLECTION OF AVAILABLE EXPERIMENTAL MATERIAL ON THE RESONANCE OBSERVED IN SYSTEMS OF STRONGLY INTERACTING PARTICLES.
AD-278 179 DIV. 25

***METAL PLATES**

SOUNDAMP TYPE RAL (RUBBER-AIR-LEAD) WAS EVALUATED FOR DAMPING VIBRATION IN STEEL PLATES. FREQUENCIES WHERE PERCENTAGE CRITICAL DAMPING WAS 3% OR HIGHER WERE 1 TO 8.9 KCPS AT 30 F, 0.8 TO 6.1 KCPS AT 40 F, BELOW 0.8 TO 4.7 KCPS AT 74 F, AND BELOW 0.8 TO 3.8 KCPS AT 90 F.
AD-278 297 DIV. 14

***METAL PLATES**
ALUMINUM

SONIC FATIGUE LIFE DETERMINATION OF AIRFRAME STRUCTURES BY SIREN TESTING.
AD-278 173 DIV. 1

***METALLIC COMPOUNDS**

PHASE EQUILIBRIA ARE REPORTED FOR THE TUNGSTEN CARBON SYSTEM. THERE ARE EUTECTICS BETWEEN W AND W2C AT 2735 C AND W3C3 AND CARBON AT 2765 C. CARBON SOLUBILITY IS EVIDENT ONLY AT 2540 C. A NEW PHASE W3C3 IS STABLE ONLY ABOVE 2540 C.
AD-278 009 DIV. 14

***METALLIC CRYSTALS**

IMPURITIES AND IMPERFECTIONS IN METALS AND SEMICONDUCTORS: PERTURBATION TREATMENT AND SECOND-ORDER PERTURBATION CORRECTIONS: DENSITY OF STATES IN SECOND ORDER TREATMENT: PERTURBATIONS IN AN ELECTRON GAS AT NON-ZERO TEMPERATURES: BLOCH WAVE SCATTERING.
AD-278 230 DIV. 17

***METALORGANIC COMPOUNDS**

CYCLOOCTATETRAENE (COT) COMPLEXES WITH IRON TRICARBONYL: X-RAY DIFFRACTION STUDIES OF (COT)FE(CO)3 AND (OC)3FE(COT)FE(CO)3 SINGLE CRYSTALS WERE MADE AND THEIR MOLECULAR AND VALENCE STRUCTURES ARE DISCUSSED.
AD-278 208 DIV. 4

***METALORGANIC COMPOUNDS**
COMPLEX COMPOUNDS

RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES. MODIFICATION OF THE RESINS BY LOWERING THEIR FLUID PHASE. LITERATURE REVIEW ON THE FORMATION OF UNSATURATED COMPOUNDS BASED ON METALORGANIC MATERIALS AND THEIR POLYMERS.
AD-278 047 DIV. 14

***METALS**
SOLID STATE PHYSICS

IMPURITIES AND IMPERFECTIONS IN METALS AND SEMICONDUCTORS: PERTURBATION TREATMENT AND SECOND-ORDER PERTURBATION CORRECTIONS: DENSITY OF STATES IN SECOND ORDER TREATMENT: PERTURBATIONS IN AN ELECTRON GAS AT NON-ZERO TEMPERATURES: BLOCH WAVE SCATTERING.
AD-278 230 DIV. 17

***METEOROLOGICAL BALLOONS**

THE DESIGN, FABRICATION, AND TESTING ARE REPORTED OF A NEOPRENE METEOROLOGICAL BALLOON CAPABLE OF RAPID RISING TO HIGH ALTITUDE.
AD-278 383 DIV. 1

***METEOROLOGICAL CHARTS**

PRELIMINARY DAILY NORTHERN HEMISPHERE 30-MILLIBAR SYNOPTIC WEATHER MAPS FOR JANUARY-MARCH 1962.
AD-277 996 DIV. 2

***METEOROLOGICAL DATA**

A GENERAL SUMMARY OF SACRAMENTO PEAK WEATHER FROM AUGUST 1954 THROUGH DECEMBER 1961.
AD-278 099 DIV. 2

***METERS**

ESTABLISHING FACILITIES AND COMPETENCE TO PRODUCE HUGGEUIZED TAUT BAND SUSPENSION PANEL METERS. A GROUP OF 100, 180, AND 250 DEGREE METERS WERE TESTED FOR MAGNETIC, ELECTRICAL, AND ENVIRONMENTAL CHARACTERISTICS.
AD-278 282 DIV. 30

***METHANES**

PROPERTIES OF ANHYDROUS NITRATES OF TRANSITION ELEMENTS: REACTIONS OF ANHYDROUS CU(NO3)2 WITH ETHERS ARE EXPLAINED TENTATIVELY. AN ACCOUNT IS GIVEN OF REACTION PRODUCTS BETWEEN BASIC ZN ACETATE AND N2O4. CRYSTALLOGRAPHIC STUDIES CONCENTRATED ON CU(NO3)2-NITROMETHANE ADDUCT AND BASIC BERYLLIUM NITRATES.
AD-278 357 DIV. 4

***MICROANALYSIS**

MICROANALYSIS: OXYGEN FLASK COMBUSTION AND VOLUMETRIC ANALYSIS OF CL, BR, I AND S IN CHEMICAL AGENTS.
AD-278 180 DIV. 4

***MICROFILM**

RELIABILITY OF MICRO-FILM CONDUCTION HEATERS AND EVALUATION OF TENSION PAD MATERIALS AND ADHESIVES AT 500 TO 600 F AND TENSILE LOAD OF 20 PSI.
AD-277 978 DIV. 30

NI LEADS, AU TABS AND A NICHROME HEATER FILM ON AN AL2O3 DIELECTRIC WERE FOUND COMPATIBLE FOR OPERATION AS A MICROFILM HEATER TO 1500 F.
AD-277 979 DIV. 30

***MICROMINIATURIZATION (ELECTRONICS)**

FOURPOLE PARAMETRIC CHARACTERIZATION OF INTEGRATED CIRCUITS. A TRANSISTOR AMPLIFIER OPERATING AS AN ENTITY RATHER THAN AS A TRANSISTOR IN COMBINATION WITH RELATED PASSIVE CIRCUIT ELEMENTS IS DISCUSSED.
AD-278 370 DIV. 8

***MICROWAVE AMPLIFIERS**

DEVELOPMENT OF AN E-BAND AMPLIFIER. DETAILS ARE PRESENTED ON THE CURRENT STATUS OF RELEVANT TUBE DEVELOPMENT, AND PROGRESS MADE ON THE NONRECIPROCAL ELECTRICALLY-TUNABLE FILTER EMPLOYING YIG SPHERES.
AD-277 950 DIV. 8

STUDY AND INVESTIGATION TO DEVELOP ANALYTIC METHODS LEADING TO THE DESIGN OF HIGH POWER KLYSTRON TYPE MICROWAVE AMPLIFIERS WITH ADVANCED CHARACTERISTICS. MATRIX METHODS TO DEVELOP A TRACTABLE THEORY OF A MULTIRESONATOR KLYSTRON IN THE PRESENCE OF A SINGLE SPACE CHARGE WAVE.
AD-278 223 DIV. 8

***MICROWAVES**
RADIATION EFFECTS

THE EFFECTS OF RADAR ON THE HUMAN BODY (RESULTS OF RUSSIAN STUDIES).
AD-278 172 DIV. 16

***MILITARY RATIONS**

QUICK-SERVE MEALS OF NON-PERISHABLE, PRIMARILY PRECOOKED, DEHYDRATED FOOD COMPONENTS IN 6- AND 25-MAN MODULES. ADOPTION OF QUICK-SERVE MEALS DEPENDENT ON AN EFFICIENT MEANS OF BOILING WATER.
AD-277 971 DIV. 29

EVALUATION OF HEATING DEVICES FOR THE QUICK-SERVE MEALS. TESTS OF A CARBON HEATER AND A MODULAR COMBUSTION HEATER.
AD-277 972 DIV. 29

***MOLECULAR SPECTROSCOPY**

PROBABILITIES OF OPTICAL TRANSITIONS FOR ATOMS AND DIATOMIC MOLECULES.
AD-278 089 DIV. 25

***MOLECULAR STRUCTURE**

CHEMICAL APPROACHES TO THE SOLUTION OF STRUCTURES OF YOHIMBINE AND STRYCHNINE BY DEGRADATION TO PRODUCTS OF KNOWN STEREOCHEMISTRY ARE DISCUSSED. THE SYNTHESES OF FLAVOPEREIRINE AND ERYTHROCENTAURIN ARE DESCRIBED.
AD-278 106 DIV. 4

***MOLECULES**

MASS SPECTROMETRIC STUDY OF ION-MOLECULE REACTIONS OCCURRING AT THERMAL ENERGIES UNDER KINETIC CONDITIONS.
AD-278 100 DIV. 25

***MOLYBDENUM**
BRAZING

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND DIFFUSION AND SOLID-STATE BONDING. PROPERTIES RECOMMENDING REFRACTORY METALS AND GRAPHITE TO AEROSPACE APPLICATIONS ARE DISCUSSED.
AD-278 193 DIV. 6

***MOLYBDENUM ALLOYS**

FIELD EMISSION MICROSCOPE PATTERNS WERE OBTAINED FROM 35 ATOM % RE-MO ALLOY, SHOWING A BCC LATTICE, AND OF MORE THAN 50 ATOM % ALLOY, SHOWING A SIGMA PHASE. FIELD INDUCED REACTIONS BETWEEN W, MO, OR PT WITH CO AND N WERE OBSERVED.
AD-278 246 DIV. 25

***MORTARS**

SERVICE TEST OF INFANTRY, SELF-PROPELLED 4.2-INCH XM106 MORTAR. INCREASED WEIGHT OF MORTAR HAD NO SIGNIFICANT EFFECT ON MOBILITY IN ARCTIC TERRAIN. EFFECTIVENESS OF MORTAR UNDER ARCTIC WINTER CONDITIONS.
AD-277 956 DIV. 22

***MOTION**

THEORETICAL STUDY OF GROUND MOTION PRODUCED BY NUCLEAR BLASTS.
AD-278 170 DIV. 25

***MOTION PICTURE PHOTOGRAPHY**

A NEW METHOD IS PRESENTED FOR HIGH SPEED MOTION-PICTURE PHOTOGRAPHY OF MOVING TRANSPARENT DROPS.
AD-278 062 DIV. 24

***NAVAL LOGISTICS**

TWO MODELS OF THE POLARIS SUPPORT SYSTEM. THE MODELS CONCERN THE VARYING SKILLS AND SPECIALTIES REQUIRED AMONG THE PERSONNEL IN RELATION TO THE SPARE PARTS IN THE LOGISTIC SYSTEM AND SERVICE OF SUBMARINES BY TENDERS.
AD-278 379 DIV. 18

***NEODYMIUM COMPOUNDS**

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS: CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES: ELECTRICAL AND PHYSICAL PROPERTIES.
AD-278 352 DIV. 25

***NEUTRON SPECTROSCOPY**

COMMENTS ON THE NEUTRON SPECTRUM OF FERROELECTRIC AND PARAELECTRIC BARIUM TITANATE.
AD-278 070 DIV. 25

***NICKEL**

ELECTRICAL BEHAVIOR OF PASSIVE IRON AND NICKEL WAS STUDIED. IRON MAY BE MADE PASSIVE BY MAKING IT AN ANODE IN AN ACID SOLUTION AND PASSING A HIGH CURRENT THROUGH THE CELL. THE NICKEL SYSTEM CAN BE CYCLED, PASSIVATED READILY, AND RECLEANED.
AD-278 213 DIV. 25

***NICKEL ALLOYS**
THERMODYNAMICS

MEASUREMENTS WERE MADE OF THE CONCENTRATION OF ADSORBED AG REQUIRED FOR NUCLEATION OF AG CRYSTALS TO OCCUR ON A W SUBSTRATE. EMF MEASUREMENTS WERE MADE ON AU-NI ALLOYS: TABULATED VALUES OF THE ACTIVITIES, FREE ENERGIES, ENTROPIES AND ENTHALPIES OF MIXING ARE GIVEN.
AD-278 068 DIV. 17

***NIOBIUM**

SPECIMENS OF ELECTRON BEAM ZONE-REFINED NB WERE SUBJECTED TO TENSILE TESTS BETWEEN 373 AND 4.2 K. POLYCRYSTALLINE AND SINGLE CRYSTALS WERE TESTED. SPECIMENS WERE EITHER DEFORMED TO FRACTURE OR THE TEMPERATURE WAS CHANGED TO MEASURE REVERSIBLE FLOW STRESS.
AD-278 051 DIV. 17

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND

PLASMAS IN INDIUM ANTIMONIDE WERE INVESTIGATED AS A FUNCTION OF CURRENT, ELECTRIC FIELD STRENGTH, AND LONGITUDINAL MAGNETIC FIELD.
AD-278 378 DIV. 25

*IODINE

MICROANALYSIS: OXYGEN FLASK COMBUSTION AND VOLUMETRIC ANALYSIS OF CL, BR, I AND S IN CHEMICAL AGENTS.
AD-278 160 DIV. 4

*ION BOMBARDMENT

P-N JUNCTION FORMATION IN SILICON BY ION BOMBARDMENT.
AD-278 150 DIV. 25

INVESTIGATION OF NUCLEAR REACTIONS INDUCED BY HEAVY ION BOMBARDMENT AND OF EXCITED LEVELS IN HEAVY NUCLEI.
AD-278 240 DIV. 20

*IONOSPHERIC PROPAGATION

HF FREQUENCIES FOR EXO- AND ENDO-IONOSPHERIC COMMUNICATIONS EMPLOYING DUCTING.
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*IONS

CYCLOTRON RESONANCE AND MAGNETO-OPTICAL EFFECTS IN SEMICONDUCTORS ARE DISCUSSED.
AD-278 081 DIV. 25

MASS SPECTROMETRIC STUDY OF ION-MOLECULE REACTIONS OCCURRING AT THERMAL ENERGIES UNDER KINETIC CONDITIONS.
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INVESTIGATION OF NUCLEAR REACTIONS INDUCED BY HEAVY ION BOMBARDMENT AND OF EXCITED LEVELS IN HEAVY NUCLEI.
AD-278 240 DIV. 20

REACTIONS OF IONS IN THE UPPER ATMOSPHERE.
AD-278 367 DIV. 2

*IRON

ELECTRICAL BEHAVIOR OF PASSIVE IRON AND NICKEL WAS STUDIED. IRON MAY BE MADE PASSIVE BY MAKING IT AN ANODE IN AN ACID SOLUTION AND PASSING A HIGH CURRENT THROUGH THE CELL. THE NICKEL SYSTEM CAN BE CYCLED, PASSIVATED READILY, AND REGLEANED.
AD-278 213 DIV. 25

*IRON COMPOUNDS

CYCLOOCTATETRAENE (COT) COMPLEXES WITH IRON TRICARBONYL: X-RAY DIFFRACTION STUDIES OF (COT)FE(CO)3 AND (C6H5)2FE(COT)FE(CO)3 SINGLE CRYSTALS WERE MADE AND THEIR MOLECULAR AND VALENCE STRUCTURES ARE DISCUSSED.
AD-278 208 DIV. 4

*IRREVERSIBLE PROCESSES

THIS ANALYSIS IS ON THE RESEARCH OF STATISTICAL MECHANICS AND THERMODYNAMICS OF IRREVERSIBLE PROCESSES.
AD-278 134 DIV. 25

*ISOMER

SYNTHESIS AND PROPERTIES OF SOME POLYPHENYLS AND BROMINE-SUBSTITUTED POLYPHENYLS. REACTIONS INVOLVING MONO-, DI-, AND TRIBROMOPOLYPHENYLS: TRI- AND TETRAPHENYL BENZENES: DIENIC ISOMERISM: CATALYTIC DEHYDRATION OF CARBONYL-COATING COMPOUNDS.
AD-278 110 DIV. 4

*JET ENGINE FUELS

PROMISING HYDROCARBON FUELS FOR AIR FORCE REQUIREMENTS ARE ALKYL-SUBSTITUTED MONOCYCLICS AND BICYCLICS FOR HIGH TEMPERATURE: ISOPARAFFIN AND TRICYCLIC STRUCTURES FOR SPECIALIZED FUELS: BICYCLICS AND VAPOR FUELS FOR FLIGHT BEYOND MACH 5: AND ENDOTHERMIC FUEL BEYOND MACH 5.
AD-277 953 DIV. 10

*JET ENGINE NOISE
SIMULATION

SONIC FATIGUE LIFE DETERMINATION OF AIRFRAME STRUCTURES BY SIREN TESTING.
AD-278 173 DIV. 1

*JET FIGHTERS

FIELD EMISSION MICROSCOPE PATTERNS WERE OBTAINED FROM 35 ATOM % RE-MO ALLOY, SHOWING A BCC LATTICE, AND OF MORE THAN 50 ATOM % ALLOY, SHOWING A SIGMA PHASE. FIELD INDUCED REACTIONS BETWEEN W, MO, OR PT WITH CO AND N WERE OBSERVED.
AD-278 246 DIV. 25

*JET FIGHTERS
NAVAL AIRCRAFT

DESIGN AND FEASIBILITY TESTING OF A FLIGHT TERMINATION DEVICE FOR THE F8F AIRCRAFT. HIGH PRESSURE GAS GENERATORS INCORPORATED IN WING DOWN-LOCK PIN HYDRAULIC CYLINDER.
AD-278 007 DIV. 1

*KINETIC THEORY

THE DYNAMICS OF IONIZED MEDIA ARE INVESTIGATED. EMPHASIS IS PLACED ON FUNDAMENTAL RATHER THAN SEMI-EMPIRICAL METHODS.
AD-278 131 DIV. 25

*KLYSTRONS

STUDY AND INVESTIGATION TO DEVELOP ANALYTIC METHODS LEADING TO THE DESIGN OF HIGH POWER KLYSTRON TYPE MICROWAVE AMPLIFIERS WITH ADVANCED CHARACTERISTICS. MATRIX METHODS TO DEVELOP A TRACTABLE THEORY OF A MULTIRESONATOR KLYSTRON IN THE PRESENCE OF A SINGLE SPACE CHARGE WAVE.
AD-278 223 DIV. 9

*LABORATORY ANIMALS

RANDOM-SEXED POPULATIONS OF SMALLER LABORATORY ANIMALS. ESTABLISHMENT OF BASELINE STANDARDS THROUGH THE STUDY OF VALUES OBTAINED FROM THE INVESTIGATION OF SOME OF THE HEMATOLOGICAL ELEMENTS ASSOCIATED WITH THE PHYSIOLOGY OF LABORATORY ANIMALS, USING SEMIMICROTECHNIQUES, ULTRAMICROTECHNIQUES, AND ELECTROMEDICAL TECHNIQUES.

AD-278 368 DIV. 16

*LABORATORY FURNACES

DESIGN OF FURNACE FOR PULLING 7 IN. DENDRITES. USE OF ALN FOR CRUCIBLES. PREPARATION OF GAAS SOLAR CELLS BY CLOSED TUBE DIFFUSION OF ZN OR CD.
AD-278 251 DIV. 4

*LAMINAR BOUNDARY LAYER

APPROXIMATE METHODS FOR TIME-DEPENDENT GAS FILM LUBRICATION PROBLEMS.
AD-278 109 DIV. 26

*LAMINATES
MECHANICAL PROPERTIES

STRENGTH AND MODULUS OF CONTINUOUS FILAMENT WOUND CYLINDRICAL STRUCTURES THROUGH QUALITY CONTROL: THE BODIES INCLUDED PARALLEL FILAMENT WOUND 18-IN.-DIAM HOOPS OF GLASS CONTENT BETWEEN 65 VOL-% 80 WT-% AND 78 VOL-% 86 WT-%. MECHANISM OF FAILURE IN FLEXURE WAS IN THE NON-GLASS REGION.
AD-278 121 DIV. 14

*LANGUAGE
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RESEARCH IS REPORTED ON AN INTERNATIONAL VOICE RADIO LANGUAGE FOR AIR OPERATIONS.
AD-278 396 DIV. 32

*LASERS

PROPERTIES OF LASER DEVICES.
AD-278 033 DIV. 25

*LATTICES

GRAIN-BOUNDARY DIFFUSION STUDIES OF AU IN CU WERE STUDIED FOR COUPLES OF BOTH A CONTINUOUS AND AN INSTANTANEOUS SOURCE. THE GRAIN-BOUNDARY DIFFUSION COEFFICIENT DECREASES WITH INCREASING SOLUTE CONCENTRATION WHERE THE LATTICE DIFFUSION EITHER INCREASES OR DECREASES RELATIVE TO THE SOLVENT.
AD-278 377 DIV. 25

*LEARNING
THEORY

DEVELOPMENT OF MODELS WHICH SIMULATE CERTAIN ASPECTS OF THE LEARNING SITUATION. TESTS OF A THEORY OF LEARNING IN COMMUNICATION SITUATIONS. DEVELOPMENT AND TESTING OF ACCEPTANCE CRITERIA.
AD-278 192 DIV. 28

*LIFT

ANALYTICAL SOLUTIONS FOR A TYPE OF VARIABLE-LIFT MODULATION APPLICABLE TO A LIFTING BODY ENTERING THE ATMOSPHERE FROM SUPERORBITAL AND ORBITAL SPEEDS.
AD-278 161 DIV. 12

*LIGHT

THEORETICAL STUDIES OF EFFECTS OF COHERENCE IN ELECTROMAGNETIC RADIATION.
AD-278 260 DIV. 25

*LIGHT COMMUNICATION SYSTEMS

INVESTIGATION OF OPTICAL SPECTRAL REGIONS FOR SPACE COMMUNICATIONS WAS INITIATED IN ORDER TO LEARN WHICH REGIONS ARE BEST, HOW WELL COMPONENTS WORK IN THESE REGIONS, AND WHAT NEW COMPONENTS NEED TO BE DEVELOPED.
AD-278 215 DIV. 5

*LIGHT TRANSMISSION
INFRARED SPECTROSCOPY

INVESTIGATION OF OPTICAL SPECTRAL REGIONS FOR SPACE COMMUNICATIONS WAS INITIATED IN ORDER TO LEARN WHICH REGIONS ARE BEST, HOW WELL COMPONENTS WORK IN THESE REGIONS, AND WHAT NEW COMPONENTS NEED TO BE DEVELOPED.
AD-278 215 DIV. 5

*LINEAR PROGRAMMING

MATHEMATICAL FORMALISMS OF COMMAND, CONTROL, AND COMMUNICATION SYSTEMS.
AD-278 211 DIV. 15

MINIMIZATION OF BOOLEAN FUNCTIONS CONTAINING UNEQUAL AND NONLINEAR COST FUNCTIONS BY LINEAR PROGRAMMING.
AD-278 392 DIV. 15

*LINEAR SYSTEMS

THE ISOTHERMAL QUASI-STATIC LINEAR THEORY OF HOMOGENEOUS AND ISOTROPIC VISCOELASTIC SOLIDS IS DISCUSSED.
AD-278 376 DIV. 9

*LIQUID ROCKET PROPELLANTS
RADIATION EFFECTS

COMPONENTS AND MATERIALS FOR USE IN SPACE PROPULSION SYSTEMS WERE TESTED FOR STABILITY UNDER SPACE CONDITIONS.
AD-278 055 DIV. 12

*LIQUIDS

A NEW METHOD IS PRESENTED FOR HIGH SPEED MOTION-PICTURE PHOTOGRAPHY OF MOVING TRANSPARENT DROPS.
AD-278 062 DIV. 24

*MAGNESIUM COMPOUNDS

TENSILE STRENGTH OF MAGNESIUM OXIDE: BI-CRYSTALS AND TRI-CRYSTALS WERE CHEMICALLY POLISHED TO REMOVE SURFACE DISLOCATION SOURCES. THE BI-CRYSTALS DEFORMED ELASTICALLY UP TO 110,000 PSI BEFORE SEPARATING FROM TENSILE GRIPS.
AD-278 209 DIV. 25

*MAGNETIC FIELDS

A STUDY IS MADE OF MAGNETOGASDYNAMIC SOURCE FLOW WITH CROSSED ELECTRIC AND MAGNETIC FIELDS.
AD-278 073 DIV. 9

THE PROPERTIES OF INJECTED ELECTRON-HOLE PLASMAS IN INDIUM ANTIMONIDE WERE INVESTIGATED AS A FUNCTION OF CURRENT, ELECTRIC FIELD STRENGTH, AND LONGITUDINAL MAGNETIC FIELD.
AD-278 378 DIV. 25

*MAGNETO-OPTIC ROTATION

CYCLOTRON RESONANCE AND MAGNETO-OPTICAL EFFECTS IN SEMICONDUCTORS ARE DISCUSSED.
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*MAGNETOHYDRODYNAMICS

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*POWER SUPPLIES

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*QUALITY CONTROL

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*QUANTUM MECHANICS

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AD-278 134 DIV. 25

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*RADAR
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RADIATION DAMAGE IN SELECTED COMPOUND (SEMICONDUCTORS.)
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*RADIATION EFFECTS

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*NIOBIUM ALLOYS

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PROPERTIES OF ANHYDROUS NITRATES OF TRANSITION ELEMENTS: REACTIONS OF ANHYDROUS CU(NO3)2 WITH ETHERS ARE EXPLAINED TENTATIVELY. AN ACCOUNT IS GIVEN OF REACTION PRODUCTS BETWEEN BASIC ZN ACETATE AND N2O4. CRYSTALLOGRAPHIC STUDIES CONCENTRATED ON CU(NO3)2-NITROMETHANE ADDUCT AND BASIC BERYLLIUM NITRATES.
AD-278 357 DIV. 4

*NITRO RADICALS

PROPERTIES OF ANHYDROUS NITRATES OF TRANSITION ELEMENTS: REACTIONS OF ANHYDROUS CU(NO3)2 WITH ETHERS ARE EXPLAINED TENTATIVELY. AN ACCOUNT IS GIVEN OF REACTION PRODUCTS BETWEEN BASIC ZN ACETATE AND N2O4. CRYSTALLOGRAPHIC STUDIES CONCENTRATED ON CU(NO3)2-NITROMETHANE ADDUCT AND BASIC BERYLLIUM NITRATES.
AD-278 357 DIV. 4

*NITROGEN

THE POSITION REGARDING RECOMBINATION TO THE NORMAL IONS OF ATOMIC NITROGEN AND OXYGEN IS EXAMINED. CALCULATIONS WERE CARRIED OUT ON DI-ELECTRONIC RECOMBINATION. RATE COEFFICIENTS AT 2000 K WERE 1.0 X 10 TO THE -13TH AND 2.5 X 10 TO THE -14TH CC/SEC, RESPECTIVELY.
AD-278 020 DIV. 4

*NON-DESTRUCTIVE TESTING

A TELEVISION X-RAY IMAGING SYSTEM FOR THE NON-DESTRUCTIVE INSPECTION OF FIBER GLASS-REINFORCED PLASTIC MISSILE CASE WALLS AND MATERIALS IS DISCUSSED. MATERIALS AND DESIGN OF THE VIDICON SENSING TUBE ARE EVALUATED.
AD-278 120 DIV. 8

*NUCLEAR MAGNETIC RESONANCE

RELATIVE EFFECTS OF MOLECULAR ASYMMETRY AND DIFFERENCES IN CONFORMATIONAL POPULATIONS CAUSING NUCLEI TO BE MAGNETICALLY NON-EQUIVALENT. NUCLEAR MAGNETIC RESONANCE SPLITTINGS DUE TO MOLECULAR ASYMMETRY.
AD-278 000 DIV. 4

THE ELECTRON EXCHANGE BETWEEN THE VARIOUS SUBSTITUENT GROUPS OF ORGANOSILICON RADICALS WAS INVESTIGATED. ELECTRON SPIN RESONANCE SPECTRA OF THE NEGATIVE IONS OF 4-BIPHENYL-TRIPHENYLSILANE, DI-(4-BIPHENYL)DIPHENYLSILANE, TETRAPHENYLSILANE, TETRA-4-BIPHENYLSILANE WERE OBTAINED.
AD-278 252 DIV. 4

*NUCLEATION

MEASUREMENTS WERE MADE OF THE CONCENTRATION OF ADSORBED AG REQUIRED FOR NUCLEATION OF AG CRYSTALS TO OCCUR ON A W SUBSTRATE. EMF MEASUREMENTS WERE MADE ON AU-NI ALLOYS: TABULATED VALUES OF THE ACTIVITIES, FREE ENERGIES, ENTROPIES AND ENTHALPIES OF MIXING ARE GIVEN.
AD-278 068 DIV. 17

*NUMBER THEORY

A NUMERICAL ESTIMATION OF THE PARTITION FUNCTION IN QUANTUM STATISTICS.
AD-278 221 DIV. 25

*NUMERICAL ANALYSIS

THE PROCEDURES REQUIRED IN THE APPLICATION OF LINEAR OPERATOR THEORY TO ONE ASPECT OF SYSTEMS ANALYSIS, WHICH IS THE TREATMENT OF EXPERIMENTAL OR DATA PROCESSING.
AD-278 143 DIV. 30

*NUMERICAL METHODS AND PROCEDURES

A NUMERICAL ESTIMATION OF THE PARTITION FUNCTION IN QUANTUM STATISTICS.
AD-278 221 DIV. 25

*OCTANES

A NUMBER OF SYNTHETIC ROUTES TO 2-(3,5-DIHYDROXYPHENYL)-3-METHYLOCTANE WERE INVESTIGATED. SYNTHESES OF SIX RELATED ALKYL RESORCINOLS WERE ALSO INVESTIGATED: 2-(3,5-DIHYDROXYPHENYL)-3,6-DIMETHYLOCTANE AND 2-(3,5-DIHYDROXYPHENYL)-3,3-DIMETHYLOCTANE WERE PREPARED.
AD-278 052 DIV. 4

*OPERATIONS RESEARCH

INFERENTIAL METHODS TO ESTIMATE THE VALUES OF PARAMETERS ASSOCIATED WITH MATHEMATICAL MODELS OF ALERT READINESS.
AD-278 135 DIV. 26

*OPTICAL MATERIALS

RESEARCH STUDIES INCLUDED THE USE OF SPECTRALLY SELECTIVE SURFACES AS SOLAR ABSORBERS; THE USE OF SPECTRALLY SELECTIVE SURFACES IN THERMIONIC DIODES; AND THE RADIATIVE CHARACTERISTICS OF PHOSPHOR MATERIALS.
AD-277 985 DIV. 8

*OPTICAL SYSTEMS

INVESTIGATION OF OPTICAL SPECTRAL REGIONS FOR SPACE COMMUNICATIONS WAS INITIATED IN ORDER TO LEARN WHICH REGIONS ARE BEST, HOW WELL COMPONENTS WORK IN THESE REGIONS, AND WHAT NEW COMPONENTS NEED TO BE DEVELOPED.
AD-278 215 DIV. 5

*OPTICS

THEORETICAL STUDIES OF EFFECTS OF COHERENCE IN ELECTROMAGNETIC RADIATION.
AD-278 260 DIV. 25

*ORBITAL FLIGHT PATHS

LINEAR ERROR ANALYSIS OF A DIFFERENTIAL CORRECTION PROCEDURE USED FOR ASTRODYNAMICAL DATA REDUCTION. DEFINITION AND DEVELOPMENT OF THE CLASS OF GENERALIZED LEAST SQUARES ESTIMATORS. RIGOROUS LEAST SQUARES AND UNWEIGHTED LEAST SQUARES ESTIMATORS AS SPECIAL CASES.
AD-278 266 DIV. 2

*ORBITAL FLIGHT PATHS
SATELLITE VEHICLES

RELATIONS AMONG LAUNCHING PARAMETERS OF AN EARTH SATELLITE AND THE SUN, THE EARTH, AND THE SATELLITE.
AD-278 163 DIV. 2

*OXIDATION

DATA INDICATE THAT PARTIALLY DECARBURIZED SKIN ON HIGH-STRENGTH STEEL PARTS INCREASES FRACTURE STRENGTH BUT LOWERS RESISTANCE TO FATIGUE. DECARBURIZATION CAN BE CONTROLLED BY MOLTEN-SALT BATHS, PROTECTIVE COATINGS, AND INERT OR CONTROLLED ATMOSPHERES.
AD-278 194 DIV. 17

*OXIDES

TENSILE STRENGTH OF MAGNESIUM OXIDE: BI-CRYSTALS AND TRI-CRYSTALS WERE CHEMICALLY POLISHED TO REMOVE SURFACE DISLOCATION SOURCES. THE BI-CRYSTALS DEFORMED ELASTICALLY UP TO 110,000 PSI BEFORE SEPARATING FROM TENSILE GRIPS.
AD-278 209 DIV. 25

*OXYGEN

THE POSITION REGARDING RECOMBINATION TO THE NORMAL IONS OF ATOMIC NITROGEN AND OXYGEN IS EXAMINED. CALCULATIONS WERE CARRIED OUT ON DI-ELECTRONIC RECOMBINATION. RATE COEFFICIENTS AT 2000 K WERE 1.0 X 10 TO THE -13TH AND 2.5 X 10 TO THE -14TH CC/SEC, RESPECTIVELY.
AD-278 020 DIV. 4

*PACKAGED CIRCUITS

FOURPOLE PARAMETRIC CHARACTERIZATION OF INTEGRATED CIRCUITS. A TRANSISTOR AMPLIFIER OPERATING AS AN ENTITY RATHER THAN AS A TRANSISTOR IN COMBINATION WITH RELATED PASSIVE CIRCUIT ELEMENTS IS DISCUSSED.
AD-278 370 DIV. 8

*PARTICLES

A COLLECTION OF AVAILABLE EXPERIMENTAL MATERIAL ON THE RESONANCE OBSERVED IN SYSTEMS OF STRONGLY INTERACTING PARTICLES.
AD-278 179 DIV. 25

*PENTABORANES

THE SYNTHESIS AND CHEMISTRY OF B POLYMERS INVOLVING PENTABORANES, DECABORANES, B10H9 AND B10H12 LIGAND COMPOUNDS, ARE DISCUSSED. THIS RESEARCH IS AIMED AT THE PRODUCTION OF MATERIALS STABLE TO HEATING AT OR ABOVE 1000 F.
AD-278 086 DIV. 4

*PERTURBATION THEORY

IMPURITIES AND IMPERFECTIONS IN METALS AND SEMICONDUCTORS: PERTURBATION TREATMENT AND SECOND-ORDER PERTURBATION CORRECTIONS; DENSITY OF STATES IN SECOND ORDER TREATMENT; PERTURBATIONS IN AN ELECTRON GAS AT NON-ZERO TEMPERATURES; BLOCH WAVE SCATTERING.
AD-278 230 DIV. 17

*PHASE STUDIES

PHASE EQUILIBRIA ARE REPORTED FOR THE TUNGSTEN CARBON SYSTEM. THERE ARE EUTECTICS BETWEEN W AND W2C AT 2735 C AND W3C3 AND CARBON AT 2765 C. CARBON SOLUBILITY IS EVIDENT ONLY AT 2540 C. A NEW PHASE W3C3 IS STABLE ONLY ABOVE 2540 C.
AD-278 009 DIV. 14

*PHENOLS

A NUMBER OF SYNTHETIC ROUTES TO 2-(3,5-DIHYDROXYPHENYL)-3-METHYLOCTANE WERE INVESTIGATED. SYNTHESES OF SIX RELATED ALKYL RESORCINOLS WERE ALSO INVESTIGATED: 2-(3,5-DIHYDROXYPHENYL)-3,6-DIMETHYLOCTANE AND 2-(3,5-DIHYDROXYPHENYL)-3,3-DIMETHYLOCTANE WERE PREPARED.
AD-278 052 DIV. 4

*PHENYL RADICALS

SYNTHESIS AND PROPERTIES OF SOME POLYPHENYLS AND BROMINE-SUBSTITUTED POLYPHENYLS. REACTIONS INVOLVING MONO-, DI-, AND TRIBROMOPOLYPHENYLS; TRI- AND TETRAPHENYL BENZENES; DIENIC ISOMERISM; CATALYTIC DEHYDRATION OF CARBONYL-COATING COMPOUNDS.
AD-278 110 DIV. 4

THE ELECTRON EXCHANGE BETWEEN THE VARIOUS SUBSTITUENT GROUPS OF ORGANOSILICON RADICALS WAS INVESTIGATED. ELECTRON SPIN RESONANCE SPECTRA OF THE NEGATIVE IONS OF 4-BIPHENYL-TRIPHENYLSILANE, DI-(4-BIPHENYL)DIPHENYLSILANE, TETRAPHENYLSILANE, TETRA-4-BIPHENYLSILANE WERE OBTAINED.
AD-278 252 DIV. 4

*PHOSPHATE COATINGS

VITREOUS AND NON-VITREOUS PHOSPHATE BONDED MATERIALS WERE DEVELOPED FOR HIGH TEMPERATURE COATINGS. THE VITREOUS COATINGS HAD EXCELLENT THERMAL SHOCK RESISTANCE AND THE PHOSPHATE BONDED SYSTEMS WITHSTOOD TEMPERATURES BEYOND THE LIMIT OF INCONEL X.
AD-278 103 DIV. 14

*PHOSPHIDES

HIGH-TEMPERATURE SEMICONDUCTORS: HIGH CONCENTRATIONS OF LATTICE DEFECTS CAN BE INTRODUCED INTO GAAS. CZOCHRALSKI APPARATUS OPERATING FOR PRODUCTION OF GAP. DISSOCIATION PRESSURE STUDIES FOR GAAS.
AD-278 049 DIV. 25

*PHOSPHONIUM RADICALS

INNER SALTS NOVEL PHOSPHONIUM AND PHOSPHORANE COMPOUNDS WERE PREPARED. PRODUCTS WHICH WERE CHARACTERIZED INCLUDED MESOMERIC PHOSPHONIUM SALTS; PENTAVALENT PHOSPHORUS COMPOUNDS; AND A MESOMERIC INNER SALT.
AD-278 229 DIV. 4

*PHOSPHORS

RESEARCH STUDIES INCLUDED THE USE OF SPECTRALLY SELECTIVE SURFACES AS SOLAR ABSORBERS; THE USE OF SPECTRALLY SELECTIVE SURFACES IN THERMIONIC DIODES; AND THE RADIATIVE CHARACTERISTICS OF PHOSPHOR MATERIALS.
AD-277 985 DIV. 8

*PHOSPHORUS COMPOUNDS

INNER SALTS NOVEL PHOSPHONIUM AND PHOSPHORANE COMPOUNDS WERE PREPARED. PRODUCTS WHICH WERE CHARACTERIZED INCLUDED MESOMERIC PHOSPHONIUM SALTS; PENTAVALENT PHOSPHORUS COMPOUNDS; AND A MESOMERIC INNER SALT.
AD-278 229 DIV. 4

*PHOTOCONDUCTIVITY

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS. CDS CRYSTAL GROWTH BY SUBLIMATION AND BY CHEMICAL TRANSPORT. PHOTOELECTRONIC ANALYSIS OF CRYSTALS. HIGH-RESISTIVITY PHOTOCONDUCTORS. SURFACE PHOTOVOLTAGE MEASUREMENTS ON CDS.
AD-278 050 DIV. 25

*PHOTOELASTICITY

STRESS WAVES DUE TO EXPLOSIVE AND MECHANICAL LOADING OF LOW MODULUS PHOTOELASTIC MATERIALS TWO DIMENSIONAL PHOTOELASTIC STUDY OF STRESSES PRODUCED IN A SQUARE PLATE RESTING ON ONE EDGE AND SUBJECTED TO EXPLOSIVE OF MECHANICAL LOADING AT THE OPPOSITE EDGE.
AD-278 201 DIV. 25

*PHOTOTUBES

STUDY OF MATERIAL INTERACTION AND MIGRATION IN CAMERA TUBES.
AD-278 042 DIV. 8

*PHYSICS

TRANSLATION OF CHAPTER 10 ON "COMBUSTION OF EXPLOSIVES" FROM THE RUSSIAN TREATISE "PHYSICS OF EXPLOSION", BY F. A. BAUM, K. P. STANYUKOVICH, AND B. I. SHEKHTER, PUBLISHED IN MOSCOW, 1959.
AD-278 133 DIV. 22

•SATELLITE ATTITUDE STABILIZATION

AN ANALYSIS IS MADE TO IDENTIFY THE PARAMETERS WHICH DETERMINE THE ALTITUDE OF STABILIZATION, DEFINED AS THE ALTITUDE AT WHICH THE ANGLE OF ATTACK RATE FIRST VANISHES FOR SLOWLY TUMBLING RE-ENTRY VEHICLES.
AD-278 288 DIV. 12

•SATELLITE VEHICLES

STUDY OF SPACE-VEHICLE ELECTRIC POWER PRODUCTION AND UTILIZATION.
AD-278 204 DIV. 12

•SATELLITE VEHICLES COMMUNICATION SYSTEMS

ANTENNA AND SYSTEM TECHNIQUES FOR SHF COMMUNICATIONS LINK.
AD-278 134 DIV. 5

•SATELLITE VEHICLES TORQUE

EFFECTS OF EXTERNAL TORQUES ON LIMIT CYCLE OPERATION OF A REACTION JET ATTITUDE CONTROL SYSTEM. DESTABILIZING TORQUES USED TO REDUCE IMPULSE REQUIRED BELOW THAT OF A TORQUE-FREE SYSTEM.
AD-278 102 DIV. 12

•SCATTERING

BACKSCATTER ECHO AT 18.6 MC.
AD-277 983 DIV. 8

AN INVESTIGATION OF THE DIRECT BACKSCATTER OF HIGH FREQUENCY RADIO WAVES FROM LAND, SEA, WATER, AND ICE SURFACES.
AD-278 138 DIV. 8

UNIQUENESS PROBLEMS IN THE MATHEMATICS OF MULTIPLE SCATTERING. SOME RECENT MATHEMATICAL STUDIES CONCERNING THE UNIQUENESS OF SOLUTIONS TO CHANDRASEKHAR'S MATHEMATICAL FORMULATION OF PRINCIPLES OF INVARIANCE IN THE THEORY OF RADIATIVE TRANSFER.
AD-278 263 DIV. 15

•SCHEDULING

INFERENTIAL METHODS TO ESTIMATE THE VALUES OF PARAMETERS ASSOCIATED WITH MATHEMATICAL MODELS OF ALERT READINESS.
AD-278 139 DIV. 26

•SCIENTIFIC REPORTS

AN EXPERIMENTAL STUDY OF BIBLIOGRAPHIC COUPLING BETWEEN TECHNICAL PAPERS.
AD-278 226 DIV. 32

•SCIENTIFIC RESEARCH MEDICAL RESEARCH

TRAUMATIC SURGERY AND SHOCK; RADIATION AND THERMAL BURNS; RIBOFLAVIN METABOLISM IN BURNED RATS; CALCIUM INFUSION TEST FOR HYPERPARATHYROIDISM; METABOLIC STUDIES OF PSEUDOMONAS INFECTION.
AD-278 064 DIV. 16

•SEA WATER REFLECTION

A STUDY WAS MADE OF DOPPLER FREQUENCY SHIFT OF HF TO SHF RADIO WAVES RETURNED FROM THE SEA.
AD-277 981 DIV. 8

•SEALS RADIATION EFFECTS

COMPONENTS AND MATERIALS FOR USE IN SPACE PROPULSION SYSTEMS WERE TESTED FOR STABILITY UNDER SPACE CONDITIONS.
AD-278 055 DIV. 12

•SELENIDES

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS; CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES; ELECTRICAL AND PHYSICAL PROPERTIES.
AD-278 352 DIV. 25

•SELF-PROPELLED GUNS

SERVICE TEST OF INFANTRY, SELF-PROPELLED 4.2-INCH AM106 MORTAR. INCREASED WEIGHT OF MORTAR HAD NO SIGNIFICANT EFFECT ON MOBILITY IN ARCTIC TERRAIN. EFFECTIVENESS OF MORTAR UNDER ARCTIC WINTER CONDITIONS.
AD-277 956 DIV. 22

•SEMICONDUCTORS

RADIATION DAMAGE IN SELECTED COMPOUND (SEMICONDUCTORS.)
AD-278 046 DIV. 20

CYCLOTRON RESONANCE AND MAGNETO-OPTICAL EFFECTS IN SEMICONDUCTORS ARE DISCUSSED.
AD-278 081 DIV. 25

ORGANIC SEMICONDUCTOR RESEARCH PROGRAM TO INVESTIGATE THE SEMICONDUCTOR PROPERTIES OF ORGANIC SOLIDS. THE DIELECTRIC, SPECTROSCOPIC AND PHOTOCONDUCTIVE PROPERTIES OF SELECTED ADDITION COMPOUNDS AND THEIR DONOR AND ACCEPTOR COMPONENTS WERE INVESTIGATED.
AD-278 123 DIV. 4

•SEMICONDUCTORS HIGH TEMPERATURE RESEARCH

HIGH-TEMPERATURE SEMICONDUCTORS; HIGH CONCENTRATIONS OF LATTICE DEFECTS CAN BE INTRODUCED INTO GAAS. CZOCHRALSKI APPARATUS OPERATING FOR PRODUCTION OF GAP. DISSOCIATION PRESSURE STUDIES FOR GAAS.
AD-278 049 DIV. 25

•SEMICONDUCTORS RARE EARTH COMPOUNDS

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS; CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES; ELECTRICAL AND PHYSICAL PROPERTIES.
AD-278 352 DIV. 25

•SEMICONDUCTORS SOLID STATE PHYSICS

IMPURITIES AND IMPERFECTIONS IN METALS AND SEMICONDUCTORS; PERTURBATION TREATMENT AND SECOND-ORDER PERTURBATION CORRECTIONS; DENSITY OF STATES IN SECOND ORDER TREATMENT; PERTURBATIONS IN AN ELECTRON GAS AT NON-ZERO TEMPERATURES; BLOCH WAVE SCATTERING.
AD-278 230 DIV. 17

•SEQUENCES

GENERATION OF RANDOM VARIABLES BY DIGITAL COMPUTER.
AD-278 358 DIV. 15

•SHEETS

AN ORIENTING DEVICE FOR A FLAT-PANEL ARRAY OF SOLAR CELLS.
AD-278 205 DIV. 7

•SHIELDING

ELECTROSTATIC SHIELDING AS A MEANS OF PROTECTING MANNED SPACE VEHICLES AGAINST SOLAR COSMIC RAYS IS DISCUSSED.
AD-277 959 DIV. 12

•SHIP HULLS

A COMPARISON OF THEORY AND EXPERIMENT FOR SLAMMING (HYDRODYNAMIC FORCES) WAS MADE ON A DUTCH DESTROYER.
AD-278 386 DIV. 31

•SHIPS

OPTIMUM SHIP ROUTING. II.
AD-278 117 DIV. 15

•SHOCK TUBES

DIFFUSION IN EXPANDING ELECTRICALLY NEUTRAL GASES WITH LARGE PRESSURE GRADIENTS. PART 3 SHOCK TUBE EXPERIMENTS.
AD-278 199 DIV. 25

•SHOCK WAVES

THE THERMODYNAMIC PROPERTIES OF A LOOSELY-PACKED GRANULAR AGGREGATE ARE CALCULATED.
AD-277 974 DIV. 9

A MACROSCOPIC THEORY OF TWO-PHASE FLOW WITH MASS, MOMENTUM, AND ENERGY EXCHANGE IS DISCUSSED.
AD-277 975 DIV. 9

ON THE EXPANSION OF SHOCK WAVES AROUND A DETONATING EXPLOSIVE BODY.
AD-278 084 DIV. 22

ON THE STRUCTURE OF SHOCK WAVES IN MONATOMIC GASES.
AD-278 220 DIV. 9

•SHOCK WAVES ANALYSIS

A SURVEY OF RECENT THEORETICAL AND EXPERIMENTAL INVESTIGATIONS OF THE STRUCTURE OF SHOCK WAVES CONSIDERS SHOCK WAVES IN MONATOMIC GASES, SHOCK WAVE RELAXATION AND DIFFUSION, DETONATION WAVES, LOW-DENSITY HYPERSONIC FLOW.
AD-278 048 DIV. 9

•SILANES

THE ELECTRON EXCHANGE BETWEEN THE VARIOUS SUBSTITUENT GROUPS OF ORGANOSILICON RADICALS WAS INVESTIGATED. ELECTRON SPIN RESONANCE SPECTRA OF THE NEGATIVE IONS OF 4-BIPHENYL-TRIPHENYLSILANE; DI-(4-BIPHENYL)DIPHENYLSILANE; TETRAPHENYLSILANE; TETRA-4-BIPHENYLSILANE WERE OBTAINED.
AD-278 252 DIV. 4

•SILICON

P-N JUNCTION FORMATION IN SILICON BY ION BOMBARDMENT.
AD-278 150 DIV. 25

•SILVER

MEASUREMENTS WERE MADE OF THE CONCENTRATION OF ADSORBED AG REQUIRED FOR NUCLEATION OF AG CRYSTALS TO OCCUR ON A W SUBSTRATE. EMF MEASUREMENTS WERE MADE ON AU-NI ALLOYS; TABULATED VALUES OF THE ACTIVITIES, FREE ENERGIES, ENTROPIES AND ENTHALPIES OF MIXING ARE GIVEN.
AD-278 068 DIV. 17

•SIMULTANEOUS EQUATIONS

OPTIMUM SUBDIVISION OF A VARIABLE BY THE METHOD OF D. R. COX. THE OBJECT IS TO DIVIDE A GIVEN VARIABLE X INTO K CLASSES IN SUCH A MANNER THAT FOR STATED K THERE IS A MINIMUM LOSS OF DETAIL.
AD-278 142 DIV. 15

•SINGLE CRYSTALS

MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS. CDS CRYSTAL GROWTH BY SUBLIMATION AND BY CHEMICAL TRANSPORT. PHOTOELECTRONIC ANALYSIS OF CRYSTALS. HIGH-RESISTIVITY PHOTOCONDUCTORS. SURFACE PHOTOVOLTAGE MEASUREMENTS ON CDS.
AD-278 050 DIV. 25

A DEVICE FOR TAKING SINGLE CRYSTAL X-RAY PHOTOGRAPHS AT TEMPERATURES UP TO 1000 C.
AD-278 071 DIV. 25

•SINGLE CRYSTALS ALUMINUM

GROWTH ORIENTED SINGLE CRYSTALS OF HIGH-PURITY ALUMINUM BY GRADIENT HEATING WITH A STRAIN ANNEAL.
AD-278 290 DIV. 17

•SLOT ANTENNAS

EXPRESSIONS ARE DEVELOPED FOR THE COMPLETE RADIATION PATTERN FROM A FINITE AXIAL SLOT ON AN INFINITE CIRCULAR CYLINDER COVERED WITH A HOMOGENEOUS, UNIFORM PLASMA SHEATH.
AD-278 146 DIV. 8

•SMALL ARMS AMMUNITION

PACKAGING SYSTEMS FOR CLIPPED NATO 7.62MM AMMUNITION; BANDOLEER DEVELOPMENT.
AD-278 198 DIV. 22

•SMOKES

THE FLOW PATTERN WHICH RESULTS WHEN A STATIONARY SOUND FIELD IS CREATED OUTSIDE AN INFINITE PLANE WALL THROUGH WHICH A FLUID IS SLOWLY DISCHARGED IS DISCUSSED.
AD-278 373 DIV. 25

•SOILS

THE DYNAMIC RESPONSE OF SHALLOW-BURIED ARCHES SUBJECTED TO BLAST LOADING.
AD-278 285 DIV. 13

•SOLAR CELLS

P-N JUNCTION FORMATION IN SILICON BY ION BOMBARDMENT.
AD-278 150 DIV. 25

AN ORIENTING DEVICE FOR A FLAT-PANEL ARRAY OF SOLAR CELLS.
AD-278 205 DIV. 7

DESIGN OF FURNACE FOR PULLING 7 IN. DENDRITES. USE OF ALN FOR CRUCIBLES. PREPARATION OF GAAS SOLAR CELLS BY CLOSED TUBE DIFFUSION OF ZN OR CD.
AD-278 291 DIV. 4

•SOLID ROCKET PROPELLANTS DECOMPOSITION

COMPOSITION OF PROPELLANTS AND MASS SPECTROMETRIC ANALYSIS OF DECOMPOSITION GASES FROM M15 AND M17 PROPELLANTS STORED FOR 3 1/2 YEARS AT 65.5 C.
AD-278 126 DIV. 10

•SOLID STATE PHYSICS

A REVIEW OF THE RESEARCH PROJECTS CONDUCTED WITHIN THE ELECTRONICS RESEARCH LABORATORY.

***RADIATION EFFECTS**
DOSE RATE

TO DETERMINE THE EFFECTS OF RADIATION AS A FOOD PRESERVATION. PACKAGED DRIED FRUITS AND VEGETABLES WERE SUBJECTED TO 0.1 TO 2.0 MRAD DOSES. RADIATION DOSES OF 0.5 MRADS OR LESS HAD HIGHER ACCEPTABILITY. THE 1.0 MRAD DOSE INDUCED DISCOLORATION. TENDERNESS MEASURED BY SHEAR PRESS METHOD.
AD-278 182 DIV. 16

***RADIATION EFFECTS**
MICROWAVES

EXPOSURE OF RATS TO MINIMAL DOSES OF MICROWAVE RADIATION (24,000 MEGACYCLES) INDUCED HEMATOPOIETIC EFFECTS OF LEUKOCYTOSIS, LYMPHOCYTOSIS, AND NEUTROPHILIA.
AD-278 022 DIV. 16

***RADIATION PYROMETERS**

MEASUREMENT OF TEMPERATURES IN IONIZED GASES BY MEANS OF INFRARED RADIATION (1) INFRARED RADIATION AND TEMPERATURES OF PLASMAJETS (2) MEASUREMENT OF GAS TEMPERATURES IN THERMAL PULSES BY MONOCHROMATIC RADIATION PYROMETRY.
AD-278 045 DIV. 25

***RADIO COMMUNICATION SYSTEMS**

THEORETICAL INVESTIGATION OF DUAL-RATE TRANSMISSIONS OVER GAUSSIAN MULTIPLICATIVE CIRCUITS.
AD-278 139 DIV. 8

HF FREQUENCIES FOR EXO- AND ENDO-IONOSPHERIC COMMUNICATIONS EMPLOYING DUCTING.
AD-278 296 DIV. 8

***RADIO COMMUNICATION SYSTEMS**
SUPERHIGH FREQUENCY

ANTENNA AND SYSTEM TECHNIQUES FOR SHF COMMUNICATIONS LINK.
AD-278 154 DIV. 5

***RADIO NAVIGATION**

DESIGN, CONSTRUCTION, AND TESTING OF A SOLID-STATE ELECTRONIC IDENTIFICATION KEYER FOR EXISTING AND FUTURE TACAN AND SIMILAR NAVIGATIONAL AID EQUIPMENTS TO REPLACE MECHANICAL KEYERS.
AD-278 218 DIV. 19

***RADIO SIGNALS**
CODING

DESIGN, CONSTRUCTION, AND TESTING OF A SOLID-STATE ELECTRONIC IDENTIFICATION KEYER FOR EXISTING AND FUTURE TACAN AND SIMILAR NAVIGATIONAL AID EQUIPMENTS TO REPLACE MECHANICAL KEYERS.
AD-278 218 DIV. 19

***RADIO TRANSMISSION**

IT IS SHOWN THAT WHEN AN IONOSPHERIC SOUNDER IS PLACED AT A DISTANCE FROM THE SEA LESS THAN 50 KM, THE STRONG BACKSCATTER FROM THE OPEN SEA WAVES AND FROM THE COASTAL SEA WAVES PRODUCES DISCRETE ECHOES WHICH MAY BE ERRONEOUSLY ATTRIBUTED TO MESOSPHERIC REFLECTIONS.
AD-277 982 DIV. 8

***RADIO WAVES**

AN INVESTIGATION OF THE DIRECT BACKSCATTER OF HIGH FREQUENCY RADIO WAVES FROM LAND, SEA, WATER, AND ICE SURFACES.
AD-278 138 DIV. 8

***RADIO WAVES**
SCATTERING

A STUDY WAS MADE OF DOPPLER FREQUENCY SHIFT OF HF TO SHF RADIO WAVES RETURNED FROM THE SEA.
AD-277 981 DIV. 8

***RADIOPROTECTIVE DRUGS**

SYNTHESIS OF BETA-MERCAPTOETHYLAMINES OF VARYING BASICITY AND LIPOSOLUBILITY.
AD-278 003 DIV. 4

***RARE EARTH COMPOUNDS**

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS; CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES; ELECTRICAL AND PHYSICAL PROPERTIES.
AD-278 352 DIV. 25

***RARE EARTH ELEMENTS**

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS; CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES; ELECTRICAL AND PHYSICAL PROPERTIES.
AD-278 352 DIV. 25

***RECOMBINATION REACTIONS**

THE POSITION REGARDING RECOMBINATION TO THE NORMAL IONS OF ATOMIC NITROGEN AND OXYGEN IS EXAMINED. CALCULATIONS WERE CARRIED OUT ON DI-ELECTRONIC RECOMBINATION. RATE COEFFICIENTS AT 2000 K WERE 1.6 X 10 TO THE -13TH AND 2.3 X 10 TO THE -14TH CC/SEC, RESPECTIVELY.
AD-278 020 DIV. 4

REACTIONS OF IONS IN THE UPPER ATMOSPHERE.
AD-278 367 DIV. 2

***RECTIFIERS**

DESIGN, PRODUCTION, AND TESTS OF HIGH VOLTAGE SILICON RECTIFIER STACKS.
AD-278 107 DIV. 8

***RE-ENTRY VEHICLES**
CELESTIAL MECHANICS

AN ANALYSIS IS MADE TO IDENTIFY THE PARAMETERS WHICH DETERMINE THE ALTITUDE OF STABILIZATION, DEFINED AS THE ALTITUDE AT WHICH THE ANGLE OF ATTACK RATE FIRST VANISHES FOR SLOWLY TUMBLING RE-ENTRY VEHICLES.
AD-278 268 DIV. 12

***RE-ENTRY VEHICLES**
MANNED

ANALYTICAL SOLUTIONS FOR A TYPE OF VARIABLE-LIFT MODULATION APPLICABLE TO A LIFTING BODY ENTERING THE ATMOSPHERE FROM SUPERORBITAL AND ORBITAL SPEEDS.
AD-278 101 DIV. 12

***REFRACTORY COATINGS**
ROCKET MOTOR NOZZLES

THE UTILITY OF PYROLYTIC GRAPHITE IN SOLID ROCKET MOTORS WAS ESTABLISHED BY EROSION MEASUREMENTS. FOR PROPELLANTS WITH FLAME TEMPERATURES BETWEEN 5600 AND 6000 F, THE EROSION RATE WAS VERY LOW. WITH A 6500 F PROPELLANT, EROSION INCREASED WITH INCREASING MOTOR PRESSURE TO 0.5 MIL/SEC AT 900 PSI.
AD-278 371 DIV. 27

***REFRACTORY MATERIALS**
AERODYNAMIC HEATING

THERMAL CONDUCTIVITY MEASUREMENTS OF STAINLESS STEEL PANELS IN STAGGER ANGLE AND SPACING OF SHINGLES. RESULTS OF STRUCTURAL TESTS AT SIMULATED CONDITIONS OF MACH 1.6 AT SEA LEVEL AND MACH 5 AT 95,000 FT.
AD-278 060 DIV. 12

***REINFORCED CONCRETE**

STATIC AND DYNAMIC LOADING TESTS WERE CONDUCTED ON PRETENSIONED CONCRETE BEAMS TO DETERMINE HOW FLEXURAL MEMBERS SHOULD BE DESIGNED, HOW TO GAIN THE GREATEST RESISTANCE TO BLAST LOADING, AND THE BEST WAY TO DESTROY SUCH STRUCTURES.
AD-278 118 DIV. 13

TESTS WERE CONDUCTED ON BEAMS AND ON REINFORCING BAR COUPONS TO DETERMINE THE RESISTANCE AND BEHAVIOR OF SIMPLE-SPAN REINFORCED CONCRETE BEAMS SUBJECTED TO IMPULSIVE LOADING.
AD-278 219 DIV. 13

***REINFORCING STEEL**

STATIC AND DYNAMIC LOADING TESTS WERE CONDUCTED ON PRETENSIONED CONCRETE BEAMS TO DETERMINE HOW FLEXURAL MEMBERS SHOULD BE DESIGNED, HOW TO GAIN THE GREATEST RESISTANCE TO BLAST LOADING, AND THE BEST WAY TO DESTROY SUCH STRUCTURES.
AD-278 118 DIV. 13

TESTS WERE CONDUCTED ON BEAMS AND ON REINFORCING BAR COUPONS TO DETERMINE THE RESISTANCE AND BEHAVIOR OF SIMPLE-SPAN REINFORCED CONCRETE BEAMS SUBJECTED TO IMPULSIVE LOADING.
AD-278 219 DIV. 13

***RELEASE MECHANISMS**
WINGS

DESIGN AND FEASIBILITY TESTING OF A FLIGHT TERMINATION DEVICE FOR THE F9F AIRCRAFT. HIGH PRESSURE GAS GENERATORS INCORPORATED IN WING DOWN-LOCK PIN HYDRAULIC CYLINDER.
AD-278 007 DIV. 1

***RELIABILITY**

CRITERIA FOR DETERMINING TESTING AND MONITORING POLICIES.
AD-278 006 DIV. 15

***RESINS**
SYNTHESIS

RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES. MODIFICATION OF THE RESINS BY LOWERING THEIR FLUID PHASE. LITERATURE REVIEW ON THE FORMATION OF UNSATURATED COMPOUNDS BASED ON METALO-ORGANIC MATERIALS AND THEIR POLYMERS.
AD-278 047 DIV. 14

***RESONANCE**

CYCLOTRON RESONANCE AND MAGNETO-OPTICAL EFFECTS IN SEMICONDUCTORS ARE DISCUSSED.
AD-278 081 DIV. 25

A COLLECTION OF AVAILABLE EXPERIMENTAL MATERIAL ON THE RESONANCE OBSERVED IN SYSTEMS OF STRONGLY INTERACTING PARTICLES.
AD-278 179 DIV. 25

***RESORCINOL**

A NUMBER OF SYNTHETIC ROUTES TO 2-(3,5-DIHYDROXYPHENYL)-3-METHYLOCTANE WERE INVESTIGATED. SYNTHESES OF SIX RELATED ALKYL RESORCINOLS WERE ALSO INVESTIGATED; 2-(3,5-DIHYDROXYPHENYL)-3,4-DIMETHYLOCTANE AND 2-(3,5-DIHYDROXYPHENYL)-3,3-DIMETHYLOCTANE WERE PREPARED.
AD-278 092 DIV. 4

***RHENIUM ALLOYS**

FIELD EMISSION MICROSCOPE PATTERNS WERE OBTAINED FROM 35 ATOM % RE-MO ALLOY, SHOWING A BCC LATTICE, AND OF MORE THAN 50 ATOM % ALLOY, SHOWING A SIGMA PHASE. FIELD INDUCED REACTIONS BETWEEN W, MO, OR PT WITH CO AND N WERE OBSERVED.
AD-278 246 DIV. 25

***RHYTHM**

UPPER AND LOWER BOUNDS FOR THE APSIDAL ANGLE IN THE THEORY OF THE SPHERICAL PENDULUM. A QUICK DERIVATION OF THE LOWER AND UPPER BOUNDS OF PUISEUX AND MALPHEN FOR THE APSIDAL ANGLE. SIMPLICATION THROUGH ELIMINATION OF THE NEED FOR CONTOUR INTEGRATION. DEMONSTRATION OF SHARPNESS OF THE BOUNDS.
AD-278 275 DIV. 15

***ROCKET LAUNCHERS**

GUN-BOOSTED ROCKET SYSTEMS.
AD-277 973 DIV. 22

***ROCKET MOTOR NOZZLES**
REFRACTORY COATINGS

THE UTILITY OF PYROLYTIC GRAPHITE IN SOLID ROCKET MOTORS WAS ESTABLISHED BY EROSION MEASUREMENTS. FOR PROPELLANTS WITH FLAME TEMPERATURES BETWEEN 5600 AND 6000 F, THE EROSION RATE WAS VERY LOW. WITH A 6500 F PROPELLANT, EROSION INCREASED WITH INCREASING MOTOR PRESSURE TO 0.5 MIL/SEC AT 900 PSI.
AD-278 371 DIV. 27

***ROCKET MOTOR NOZZLES**
SOLID ROCKET PROPELLANTS

THERMAL SHOCK AND EROSION CHARACTERISTICS OF TUNGSTEN UNDER SIMULATED SOLID PROPELLANT NOZZLE CONDITIONS.
AD-278 277 DIV. 27

***ROCKET MOTORS**
RADIATION EFFECTS

COMPONENTS AND MATERIALS FOR USE IN SPACE PROPULSION SYSTEMS WERE TESTED FOR STABILITY UNDER SPACE CONDITIONS.
AD-278 055 DIV. 12

***ROCKET MOTORS**
REFRACTORY MATERIALS

THE UTILITY OF PYROLYTIC GRAPHITE IN SOLID ROCKET MOTORS WAS ESTABLISHED BY EROSION MEASUREMENTS. FOR PROPELLANTS WITH FLAME TEMPERATURES BETWEEN 5600 AND 6000 F, THE EROSION RATE WAS VERY LOW. WITH A 6500 F PROPELLANT, EROSION INCREASED WITH INCREASING MOTOR PRESSURE TO 0.5 MIL/SEC AT 900 PSI.
AD-278 371 DIV. 27

***ROCKETS**
GUN LAUNCHED

GUN-BOOSTED ROCKET SYSTEMS.
AD-277 973 DIV. 22

***RUBBER SEALS**

A VITON B STOCK (377-122) WAS TESTED FOR USE AS AN ELASTOMERIC SEAL MATERIAL FOR 5200 PSI AIR SYSTEMS. DYNAMIC AND STATIC TESTS OF 377-122 O-RINGS LUBRICATED WITH DRY MOS2 VERIFIED THE SUITABILITY OF THE STOCK AND THE MOS2 LUBRICANT.
AD-278 271 DIV. 14

***SALTS**

INNER SALTS NOVEL PHOSPHONIUM AND PHOSPHORANE COMPOUNDS WERE PREPARED. PRODUCTS WHICH WERE CHARACTERIZED INCLUDED MESOMERIC PHOSPHONIUM SALTS; PENTAVALENT PHOSPHORUS COMPOUNDS; AND A MESOMERIC INNER SALT.
AD-278 229 DIV. 4

***TEMPERATURE**

MEASUREMENT OF TEMPERATURES IN IONIZED GASES BY MEANS OF INFRARED RADIATION (1) INFRARED RADIATION AND TEMPERATURES OF PLASMAJETS (2) MEASUREMENT OF GAS TEMPERATURES IN THERMAL PULSES BY MONOCHROMATIC RADIATION PYROMETRY.
AD-278 045 DIV. 25

A SURVEY OF HIGH-ALTITUDE ATMOSPHERIC TEMPERATURE SENSORS AND ASSOCIATED PROBLEMS.
AD-278 152 DIV. 2

THE EXPERIMENTAL APPLICATION OF SONIC-PNEUMATIC PROBE SYSTEMS TO TEMPERATURE MEASUREMENT IN A HYPERSONIC AIRSTREAM.
AD-278 386 DIV. 9

***TEMPERATURE SENSITIVE ELEMENTS**

A SURVEY OF HIGH-ALTITUDE ATMOSPHERIC TEMPERATURE SENSORS AND ASSOCIATED PROBLEMS.
AD-278 152 DIV. 2

***TEST FACILITIES**

RADIOFREQUENCY TESTING AND MISCELLANEOUS METHODS LEADING TO PERFECTION OF INSTRUMENTATION OF ELECTRO-EXPLOSIVE DEVICES.
AD-278 383 DIV. 22

***TEST SETS**

A STUDY WAS INITIATED ON ELECTRON FOCUSING BY NON-LINEAR SPIRALS. A FLOOD-GUN SYSTEM WAS DEVELOPED FOR THE TESTING OF EXPERIMENTAL GUN STRUCTURES FOR IMAGE TUBES. DIODE-TYPE AND TRIODE-TYPE FIELD LENSES WERE STUDIED FOR AN ELECTROSTATIC IMAGE TUBE.
AD-278 096 DIV. 8

***TESTS**

CRITERIA FOR DETERMINING TESTING AND MONITORING POLICIES.
AD-278 006 DIV. 15

***THEORY**

THE STATISTICAL THEORY OF THE CONDENSATION OF WATER VAPOR IS TREATED.
AD-278 248 DIV. 25

***THERMAL INSULATION**

VITREOUS AND NON-VITREOUS PHOSPHATE BONDED MATERIALS WERE DEVELOPED FOR HIGH TEMPERATURE COATINGS. THE VITREOUS COATINGS HAD EXCELLENT THERMAL SHOCK RESISTANCE AND THE PHOSPHATE BONDED SYSTEMS WITHSTOOD TEMPERATURES BEYOND THE LIMIT OF INCONEL X.
AD-278 103 DIV. 14

***THERMAL INSULATION**
DESIGN

THERMAL CONDUCTIVITY MEASUREMENTS OF STAINLESS STEEL PANELS IN STAGGER ANGLE AND SPACING OF SHINGLES. RESULTS OF STRUCTURAL TESTS AT SIMULATED CONDITIONS OF MACH 1.6 AT SEA LEVEL AND MACH 5 AT 95,000 FT.
AD-278 060 DIV. 12

***THERMAL RADIATION**
RADIATION EFFECTS

TRAUMATIC SURGERY AND SHOCK; RADIATION AND THERMAL BURNS; RIBOFLAVIN METABOLISM IN BURNED RATS; CALCIUM INFUSION TEST FOR HYPERPARATHYROIDISM; METABOLIC STUDIES OF PSEUDOMONAS INFECTION.
AD-278 064 DIV. 16

***THERMIONIC EMISSION**

RESEARCH STUDIES INCLUDED THE USE OF SPECTRALLY SELECTIVE SURFACES AS SOLAR ABSORBERS; THE USE OF SPECTRALLY SELECTIVE SURFACES IN THERMIONIC DIODES; AND THE RADIATIVE CHARACTERISTICS OF PHOSPHOR MATERIALS.
AD-277 985 DIV. 8

***THERMIONIC EMISSION**
CATHODES (ELECTRON TUBES)

FIELD EMISSION MICROSCOPE PATTERNS WERE OBTAINED FROM 35 ATOM % RE-MO ALLOY, SHOWING A BCC LATTICE, AND OF MORE THAN 50 ATOM % ALLOY, SHOWING A SIGMA PHASE. FIELD INDUCED REACTIONS BETWEEN W, MO, OR PT WITH CO AND N WERE OBSERVED.
AD-278 246 DIV. 25

***THERMISTORS**

A SURVEY OF HIGH-ALTITUDE ATMOSPHERIC TEMPERATURE SENSORS AND ASSOCIATED PROBLEMS.
AD-278 152 DIV. 2

***THERMOCOUPLES**

VACUUM DEPOSITED THERMOCOUPLE DEVELOPMENT AND INSTRUMENTED ELECTRO-EXPLOSIVE DEVICE CHARACTERISTICS.
AD-278 384 DIV. 22

***THERMODYNAMICS**

THE THERMODYNAMIC PROPERTIES OF A LOOSELY-PACKED GRANULAR AGGREGATE ARE CALCULATED.
AD-277 976 DIV. 9

THIS ANALYSIS IS ON THE RESEARCH OF STATISTICAL MECHANICS AND THERMODYNAMICS OF IRREVERSIBLE PROCESSES.
AD-278 134 DIV. 25

THE PRESENT STATUS OF KNOWLEDGE OF HIGH-TEMPERATURE TRANSPORT COEFFICIENTS OF AIR, AIR CONSTITUENTS, AND THE RARE GASES IS REVIEWED.
AD-278 149 DIV. 9

HIGH ENERGY PLASMA GENERATION AND CONTROL.
AD-278 153 DIV. 25

***THERMOELECTRICITY**

THE DEVELOPMENT OF A 5-WATT, LABORATORY-TYPE, HIGH-TEMPERATURE THERMOELECTRIC GENERATOR FOR USE AS A SPACE VEHICLE POWER SUPPLY.
AD-278 227 DIV. 7

THE DESIGN, CONSTRUCTION, AND MODEL TESTS OF A 1-TON WATER-TO-WATER THERMOELECTRIC COOLER FOR SERVICE ABOARD SUBMARINES ARE DESCRIBED.
AD-278 351 DIV. 13

***THERMOELECTRICITY**
COOLING

FEASIBILITY OF THERMOELECTRIC POWER GENERATION AND COOLING FOR OCCUPIED COMPARTMENTS AND AVIONIC EQUIPMENT IN SUBSONIC AND SUPERSONIC FLIGHT VEHICLES.
AD-278 078 DIV. 12

***THERMOELECTRICITY**
ELECTRIC POWER PRODUCTION

A GUIDED MISSILE MISS-DISTANCE INDICATOR.
AD-278 076 DIV. 22

***THIN FILMS**

INVESTIGATION AND STUDY OF THE OCCURRENCE OF THIN FILMS AND THEIR EFFECTS ON ELECTRON TUBE OPERATION. STATISTICAL ANALYSIS OF DATA FROM THE RANDOM BALANCE EXPERIMENT.
AD-278 093 DIV. 8

***TITANATES**

RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES. MODIFICATION OF THE RESINS BY LOWERING THEIR FLUID PHASE. LITERATURE REVIEW ON THE FORMATION OF UNSATURATED COMPOUNDS BASED ON METALORGANIC MATERIALS AND THEIR POLYMERS.
AD-278 047 DIV. 14

COMMENTS ON THE NEUTRON SPECTRUM OF FERROELECTRIC AND PARAELECTRIC BARIUM TITANATE.
AD-278 070 DIV. 25

***TITANIUM COMPOUNDS**

RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES. MODIFICATION OF THE RESINS BY LOWERING THEIR FLUID PHASE. LITERATURE REVIEW ON THE FORMATION OF UNSATURATED COMPOUNDS BASED ON METALORGANIC MATERIALS AND THEIR POLYMERS.
AD-278 047 DIV. 14

***TOPOLOGY**

RESEARCH ON INTERPOLATION PROBLEMS BY BOUNDED ANALYTIC FUNCTIONS.
AD-278 144 DIV. 15

A NUMERICAL ESTIMATION OF THE PARTITION FUNCTION IN QUANTUM STATISTICS.
AD-278 221 DIV. 25

***TOXICITY**

CLINICAL TESTING OF TISSUE; HUMAN PLASMA FOR RECOVERY OF BORON AFTER EXPERIMENTAL AND ACCIDENTAL EXPOSURE TO BORON COMPOUNDS OF DECABORANES; BORON HYDRIDES; BORIC ACID; AND BORATES UNDER VARIOUS CONDITIONS OF OIL-WATER DISTRIBUTION. TOXICITY OF DECABORANES.
AD-278 360 DIV. 4

***TRANSISTOR AMPLIFIERS**

FOURPOLE PARAMETRIC CHARACTERIZATION OF INTEGRATED CIRCUITS. A TRANSISTOR AMPLIFIER OPERATING AS AN ENTITY RATHER THAN AS A TRANSISTOR IN COMBINATION WITH RELATED PASSIVE CIRCUIT ELEMENTS IS DISCUSSED.
AD-278 370 DIV. 8

***TRANSISTORS**

PRODUCTION ENGINEERING MEASURE FOR PROCESSES APPLICABLE TO THE ELECTROCHEMICAL ETCHED TRANSISTORS. TO DESIGN AND CONSTRUCT SEMI-AUTOMATIC PRODUCTION EQUIPMENT WITH A CAPABILITY OF PARTS PRODUCTION DIRECTED TOWARDS A RATE OF AT LEAST 600 TRANSISTORS PER 8 HOUR DAY.
AD-278 018 DIV. 8

EQUIVALENCE OF NON-RECIPROCAL ACTIVE AND PASSIVE NETWORKS. THE MATHEMATICAL BACKGROUND OF THE CONGRUENCE TRANSFORMATION AS APPLIED TO THE THEORY OF EQUIVALENT NETWORKS IS DEVELOPED.
AD-278 184 DIV. 8

***TRANSITION ELEMENTS**

PROPERTIES OF ANHYDROUS NITRATES OF TRANSITION ELEMENTS; REACTIONS OF ANHYDROUS CU(NO3)2 WITH ETHERS ARE EXPLAINED TENTATIVELY. AN ACCOUNT IS GIVEN OF REACTION PRODUCTS BETWEEN BASIC ZN ACETATE AND N2O4. CRYSTALLOGRAPHIC STUDIES CONCENTRATED ON CU(NO3)2-NITROMETHANE ADDUCT AND BASIC BERYLLIUM NITRATES.
AD-278 359 DIV. 4

***TRANSMISSION LINES**

NON-IDEAL CIRCULATORS WERE USED WITH NEGATIVE CONDUCTANCE AMPLIFIERS, NAMELY MASERS, PARAMETRIC AMPLIFIERS, AND TUNNEL DIODE AMPLIFIERS. IN ORDER TO MAKE THE DEVICES UNI-DIRECTIONAL, THEREBY IMPROVING STABILITY AND NOISE FIGURE.
AD-277 988 DIV. 8

***TRANSMIT-RECEIVE TUBES**

STUDY AND INVESTIGATION OF DESIGN PARAMETERS OF HIGH-POWER GASEOUS DISCHARGE TUBES.
AD-278 233 DIV. 8

***TRANSPORT PLANES**
FLIGHT TESTING

YAC-1UH CATEGORY II PERFORMANCE AND STABILITY TESTS APPENDIX III - TABLES.
AD-278 065 DIV. 1

***TRANSPORT PROPERTIES**

THE PRESENT STATUS OF KNOWLEDGE OF HIGH-TEMPERATURE TRANSPORT COEFFICIENTS OF AIR, AIR CONSTITUENTS, AND THE RARE GASES IS REVIEWED.
AD-278 149 DIV. 9

***TRAVELING WAVE TUBES**

DEVELOPMENT OF AN E-BAND AMPLIFIER. DETAILS ARE PRESENTED ON THE CURRENT STATUS OF RELEVANT TUBE DEVELOPMENT, AND PROGRESS MADE ON THE NON-RECIPROCAL ELECTRICALLY-TUNABLE FILTER EMPLOYING YIG SPHERES.
AD-277 950 DIV. 8

***TUNGSTEN**

MEASUREMENTS WERE MADE OF THE CONCENTRATION OF ADSORBED AG REQUIRED FOR NUCLEATION OF AG CRYSTALS TO OCCUR ON A W SUBSTRATE. EMF MEASUREMENTS WERE MADE ON AU-NI ALLOYS; TABULATED VALUES OF THE ACTIVITIES, FREE ENERGIES, ENTROPIES AND ENTHALPIES OF MIXING ARE GIVEN.
AD-278 068 DIV. 17

***TUNGSTEN**
BRAZING

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND DIFFUSION AND SOLID-STATE BONDING. PROPERTIES RECOMMENDING REFRACTORY METALS AND GRAPHITE TO AEROSPACE APPLICATIONS ARE DISCUSSED.
AD-278 193 DIV. 6

***TUNGSTEN**
THERMAL STRESSES

THERMAL SHOCK AND EROSION CHARACTERISTICS OF TUNGSTEN UNDER SIMULATED SOLID PROPELLANT NOZZLE CONDITIONS.
AD-278 277 DIV. 27

***TUNGSTEN**
VAPOR PLATING

ACTIVITY INVOLVED (1) VAPOR DEPOSITION OF TUNGSTEN ONTO POLARIS NOZZLE COMPONENTS; (2) DEPOSITION OF HIGH-PURITY W FROM TUNGSTEN HEXAFLUORIDES ONTO A W-BERYLLIA HERM NOZZLE INSERT AND A STANDARD GRAPHITE TEST NOZZLE INSERTS; AND (3) BASIC INVESTIGATIONS OF W VAPOR-DEPOSITED PROCESS VARIABLES.
AD-278 010 DIV. 26

***TUNGSTEN COMPOUNDS**

PHASE EQUILIBRIA ARE REPORTED FOR THE TUNGSTEN CARBON SYSTEM. THERE ARE EUTECTICS BETWEEN W AND W2C AT 2735 C AND 45C3 AND CARBON AT 2765 C. CARBON SOLUBILITY IS EVIDENT ONLY AT 2540 C. A NEW PHASE W5C3 IS STABLE ONLY ABOVE 2540 C.
AD-278 009 DIV. 14

***UNDERGROUND STRUCTURES**

THE DYNAMIC RESPONSE OF SHALLOW-BURIED ARCHES SUBJECTED TO BLAST LOADING.
AD-278 385 DIV. 13

CIRCUITS, COMPUTER THEORY AND PROGRAMMING, ELECTRON STREAMS AND INTERACTIONS, PLASMAS, RADIATION AND PROPAGATION, SOLID-STATE ELECTRONICS, SYSTEMS, MISCELLANEOUS.
AD-278 395 DIV. 8

*SOLIDS

THEORETICAL STUDY OF GROUND MOTION PRODUCED BY NUCLEAR BLASTS.
AD-278 170 DIV. 25

*SOUND

THE FLOW PATTERN WHICH RESULTS WHEN A STATIONARY SOUND FIELD IS CREATED OUTSIDE AN INFINITE PLANE WALL THROUGH WHICH A FLUID IS SLOWLY DISCHARGED IS DISCUSSED.
AD-278 373 DIV. 29

*SPACE ENVIRONMENTAL CONDITIONS

COMPONENTS AND MATERIALS FOR USE IN SPACE PROPULSION SYSTEMS WERE TESTED FOR STABILITY UNDER SPACE CONDITIONS.
AD-278 059 DIV. 12

*SPACESHIPS

STUDY OF SPACE-VEHICLE ELECTRIC POWER PRODUCTION AND UTILIZATION.
AD-278 204 DIV. 12

*SPECIAL FUNCTIONS

MINIMIZATION OF BOOLEAN FUNCTIONS CONTAINING UNEQUAL AND NONLINEAR COST FUNCTIONS BY LINEAR PROGRAMMING.
AD-278 392 DIV. 15

*SPECTROGRAPHIC ANALYSIS

THE ESR SPECTRUM AND SPIN DENSITIES FOR THE BIQUATERNARY BIPYRIDYL RADICAL CATION ARE DISCUSSED.
AD-277 998 DIV. 25

*SPHERES

VORTEX SHEDDING, TRANSITION AND GROWTH OF LUMINOUS WAKES BEHIND SPHERES AT MACH 15 TO 25.
AD-278 289 DIV. 9

*SPRINGS

ESTABLISHING FACILITIES AND COMPETENCE TO PRODUCE RUGGEDIZED TAUT BAND SUSPENSION PANEL METERS. A GROUP OF 100, 180, AND 250 DEGREE METERS WERE TESTED FOR MAGNETIC, ELECTRICAL, AND ENVIRONMENTAL CHARACTERISTICS.
AD-278 282 DIV. 30

*STABILIZATION
THEORY

EFFECTS OF EXTERNAL TORQUES ON LIMIT CYCLE OPERATION OF A REACTION JET ATTITUDE CONTROL SYSTEM. DESTABILIZING TORQUES USED TO REDUCE IMPULSE REQUIRED BELOW THAT OF A TORQUE-FREE SYSTEM.
AD-278 102 DIV. 12

*STAINLESS STEEL
STRESSES

DETERMINATION OF CAUSES OF CRACKING IN WELDING AGE HANDLNABLE HIGH TEMPERATURE ALLOYS (A-286 WELDMENTS), AND STRAIN AGED OF RENE 41 AND INCONEL X.
AD-278 239 DIV. 17

*STATICS

THE WEIGHT OF A REDUNDANT, PIN-JOINTED, PLANAR TRUSS OF A GIVEN OUTLINE WHICH SUPPORTS ALTERNATIVE LOADINGS IS DISCUSSED.
AD-278 293 DIV. 25

*STATISTICAL ANALYSIS

INVESTIGATION AND STUDY OF THE OCCURRENCE OF THIN FILMS AND THEIR EFFECTS ON ELECTRON TUBE OPERATION. STATISTICAL ANALYSIS OF DATA FROM THE RANDOM BALANCE EXPERIMENT.
AD-278 099 DIV. 8

*STATISTICAL DISTRIBUTIONS

THIS ANALYSIS IS ON THE RESEARCH OF STATISTICAL MECHANICS AND THERMODYNAMICS OF IRREVERSIBLE PROCESSES.
AD-278 134 DIV. 25

OPTIMUM SUBDIVISION OF A VARIABLE BY THE METHOD OF D. H. COX. THE OBJECT IS TO DIVIDE A GIVEN VARIABLE X INTO K CLASSES IN SUCH A MANNER THAT FOR STATED K THERE IS A MINIMUM LOSS OF DETAIL.
AD-278 142 DIV. 15

GENERATION OF RANDOM VARIABLES BY DIGITAL COMPUTER.
AD-278 358 DIV. 15

*STATISTICAL FUNCTIONS

THIS ANALYSIS IS ON THE RESEARCH OF STATISTICAL MECHANICS AND THERMODYNAMICS OF IRREVERSIBLE PROCESSES.
AD-278 134 DIV. 25

ANALYSIS OF ERRORS IN ESTIMATION OF THE IMPULSIVE RESPONSE OF A LINEAR, TIME-INVARIANT SYSTEM.
AD-278 394 DIV. 15

*STEEL

EXPLOSIVE WELDING OF AL, BRASS, CU, STEEL, AND TA IN VARIOUS COMBINATIONS OF SINGLE AND MULTIPLE WELDS IS DISCUSSED. WORK-HARDENING DATA AND MICROSTRUCTURE INDICATE THE METALLURGICAL PROPERTIES OF THESE WELDS OF SIMILAR AND DISSIMILAR METAL COMBINATIONS.
AD-278 354 DIV. 17

EIGHT COATING SYSTEMS WERE EVALUATED AS PROTECTIVE COATING SYSTEMS FOR STEEL PILES. COATED SHEET AND H PILES WERE DRIVEN IN THE SURF AT POINT HUENEME AND EXPOSED 12 TO 30 MONTHS. A VINYL MASTIC COATING WAS THE MOST ECONOMICAL PROTECTION.
AD-278 356 DIV. 14

*STEEL
DAMPING

SOUNDAMP TYPE RAL (RUBBER-AIR-LEAD) WAS EVALUATED FOR DAMPING VIBRATION IN STEEL PLATES. FREQUENCIES WHERE PERCENTAGE CRITICAL DAMPING WAS 3% OR HIGHER WERE 1 TO 8.9 KCPS AT 30 F, 0.8 TO 6.1 KCPS AT 40 F, BELOW 0.8 TO 4.7 KCPS AT 74 F, AND BELOW 0.8 TO 3.8 KCPS AT 90 F.
AD-278 297 DIV. 14

*STEEL
MECHANICAL PROPERTIES

DATA INDICATE THAT PARTIALLY DECARBURIZED SKIN ON HIGH-STRENGTH STEEL PARTS INCREASES FRACTURE STRENGTH BUT LOWERS RESISTANCE TO FATIGUE. DECARBURIZATION CAN BE CONTROLLED BY MOLTEN-SALT BATHS, PROTECTIVE COATINGS, AND INERT OR CONTROLLED ATMOSPHERES.
AD-278 194 DIV. 17

*STEREOCHEMISTRY

CHEMICAL APPROACHES TO THE SOLUTION OF STRUCTURES OF YOHIMBINE AND STRYCHNINE BY DEGRADATION TO PRODUCTS OF KNOWN STEREOCHEMISTRY ARE DISCUSSED. THE SYNTHESES OF FLAVOPEREIRINE AND ERYTHROCENTAURIN ARE DESCRIBED.
AD-278 106 DIV. 4

*STORAGE TUBES

STUDY OF MATERIAL INTERACTION AND MIGRATION IN CAMERA TUBES.
AD-278 042 DIV. 8

*STRAIN GAGES

THEORETICAL AND EXPERIMENTAL ANALYSIS OF STRESSES AND STRAINS IN GLASS-REINFORCED PLASTIC WINDSHIELDS.
AD-278 096 DIV. 14

*STRESSES

CROSS STRESSES IN THE FLOW OF DIFFERENT GASES.
AD-278 214 DIV. 9

THE WEIGHT OF A REDUNDANT, PIN-JOINTED, PLANAR TRUSS OF A GIVEN OUTLINE WHICH SUPPORTS ALTERNATIVE LOADINGS IS DISCUSSED.
AD-278 293 DIV. 25

*STRESSES
ANALYSIS

STRESS WAVES DUE TO EXPLOSIVE AND MECHANICAL LOADING OF LOW MODULUS PHOTOELASTIC MATERIALS TWO DIMENSIONAL PHOTOELASTIC STUDY OF STRESSES PRODUCED IN A SQUARE PLATE RESTING ON ONE EDGE AND SUBJECTED TO EXPLOSIVE OR MECHANICAL LOADING AT THE OPPOSITE EDGE.
AD-278 201 DIV. 25

*STRUCTURAL SHELLS

TESTS OF MACHINED DEEP SPHERICAL SHELLS UNDER EXTERNAL HYDROSTATIC PRESSURE.
AD-278 075 DIV. 9

PLASTIC BUCKLING OF THIN SHALLOW SPHERICAL SHELLS.
AD-278 101 DIV. 25

*STRUCTURES

THE WEIGHT OF A REDUNDANT, PIN-JOINTED, PLANAR TRUSS OF A GIVEN OUTLINE WHICH SUPPORTS ALTERNATIVE LOADINGS IS DISCUSSED.
AD-278 293 DIV. 25

*SUBJECT HEADINGS

FIRST REVISION OF THESAURUS OF ASTIA DESCRIPTORS. DISCUSSION OF OBJECTIVES AND GENERAL APPROACH USED IN THE PREPARATION OF THE FORTHCOMING SECOND EDITION OF THE THESAURUS OF ASTIA DESCRIPTORS.
AD-278 168 DIV. 32

*SUBMARINES

THE DESIGN, CONSTRUCTION, AND MODEL TESTS OF A 1-TON WATER-TO-WATER THERMOELECTRIC COOLER FOR SERVICE ABOARD SUBMARINES ARE DESCRIBED.
AD-278 391 DIV. 13

TWO MODELS OF THE POLARIS SUPPORT SYSTEM. THE MODELS CONCERN THE VARYING SKILLS AND SPECIALTIES REQUIRED AMONG THE PERSONNEL IN RELATION TO THE SPARE PARTS IN THE LOGISTIC SYSTEM AND SERVICE OF SUBMARINES BY TENDERS.
AD-278 379 DIV. 18

*SUBSONIC FLOW

A STUDY IS MADE OF MAGNETOGASDYNAMIC SOURCE FLOW WITH CROSSED ELECTRIC AND MAGNETIC FIELDS.
AD-278 073 DIV. 9

*SULFUR

MICROANALYSIS: OXYGEN FLASK COMBUSTION AND VOLUMETRIC ANALYSIS OF CL, BR, I AND S IN CHEMICAL AGENTS.
AD-278 160 DIV. 4

*SULFUR DYES

RESEARCH ON FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES IS REPORTED. COMPOUNDS WHICH WILL REACT RAPIDLY WITH SMALL AMOUNTS OF PROTEIN AND/OR NUCLEIC ACIDS, PRODUCING A SHIFT IN FLUORESCENT INTENSITY, AND WHICH ARE USEFUL FOR THE DETECTION OF AEROLIZED BACTERIA, ARE DISCUSSED.
AD-278 359 DIV. 3

*SUPERSONIC FLOW

A STUDY IS MADE OF MAGNETOGASDYNAMIC SOURCE FLOW WITH CROSSED ELECTRIC AND MAGNETIC FIELDS.
AD-278 073 DIV. 9

*SUPERSONIC WIND TUNNELS
INSTRUMENTATION

RADIO TELEMETRY OF STAGNATION PRESSURE FROM A WIND TUNNEL MODEL MAGNETICALLY SUPPORTED IN SUPERSONIC FLOW.
AD-278 139 DIV. 30

*SURGERY

TRAUMATIC SURGERY AND SHOCK: RADIATION AND THERMAL BURNS: RIBOFLAVIN METABOLISM IN BURNED RATS: CALCIUM INFUSION TEST FOR HYPERPARATHYROIDISM: METABOLIC STUDIES OF PSEUDOMONAS INFECTION.
AD-278 064 DIV. 16

*TANTALUM

DEVELOPMENTS IN THE JOINING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN AND GRAPHITE ARE SUMMARIZED, INCLUDING BRAZING PROCESSES AND DIFFUSION AND SOLID-STATE BONDING. PROPERTIES RECOMMENDING REFRACTORY METALS AND GRAPHITE TO AEROSPACE APPLICATIONS ARE DISCUSSED.
AD-278 193 DIV. 8

EXPLOSIVE WELDING OF AL, BRASS, CU, STEEL, AND TA IN VARIOUS COMBINATIONS OF SINGLE AND MULTIPLE WELDS IS DISCUSSED. WORK-HARDENING DATA AND MICROSTRUCTURE INDICATE THE METALLURGICAL PROPERTIES OF THESE WELDS OF SIMILAR AND DISSIMILAR METAL COMBINATIONS.
AD-278 354 DIV. 17

*TARGET DRONES

DESIGN AND FEASIBILITY TESTING OF A FLIGHT TERMINATION DEVICE FOR THE F9F AIRCRAFT. HIGH PRESSURE GAS GENERATORS INCORPORATED IN WING DOWN-LOCK PIN HYDRAULIC CYLINDER.
AD-278 007 DIV. 1

*TELEMETERING
DESIGN

RADIO TELEMETRY OF STAGNATION PRESSURE FROM A WIND TUNNEL MODEL MAGNETICALLY SUPPORTED IN SUPERSONIC FLOW.
AD-278 139 DIV. 30

*TELLURIDES

A STUDY OF THE SEMICONDUCTING PROPERTIES OF RARE EARTH METALS AND COMPOUNDS IS REPORTED. ITEMS DISCUSSED INCLUDE: PURIFICATION OF RARE EARTH METALS: CRYSTAL GROWTH AND STRUCTURE OF SELECTED SELENIDES AND TELLURIDES: ELECTRICAL AND PHYSICAL PROPERTIES.
AD-278 352 DIV. 25

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-278 007 Div. 1
(TISTA/GEC) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
DESIGN, DEVELOPMENT, AND FEASIBILITY STUDY OF A SAFE DEVICE FOR TERMINATING THE FLIGHT OF AN F9F DRONE,
by John Ward. Jan 62, 18p. incl. illus. (NOTS TP 2948)
(NAVWEPS rept. no. 7924)
Unclassified report

DESCRIPTORS: *Target drones, *Jet fighters, *Release mechanisms, Safety devices, Control systems, Gas generating systems, Design, Feasibility studies, Naval aircraft, Wings.

The design and feasibility testing of a flight termination device for the Navy F9F aircraft are described. The device consists of a high pressure gas generator incorporated in the wing downlock pin hydraulic cylinder of the drone. By pulling the pin in flight the aircraft's wing will fold, thereby causing the aircraft to spin down to earth. The feasibility testing involved pulling the pin under a simulated wing load comparable to that experienced in flight. (Author)

AD-278 065 Div. 1
(TISTA/GEC) OTS price $10.50

Air Force Flight Test Center, Edwards Air Force Base, Calif.
YAC-1DH CATEGORY II PERFORMANCE AND STABILITY TESTS. APPENDIX III,
by Slaton L. Johns and J. K. Campbell. Nov 60, 136p. (App. no. 3 to Rept. no. AFFTC TR 60-41, AD-247 544)
Unclassified report

DESCRIPTORS: *Transport planes, Stability, Effectiveness, Reliability, Take-off, Landing, Tables, Flight testing.

AD-278 173 Div. 1, 25
(TISTA/VGW) OTS price $2.25

Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
SONIC FATIGUE LIFE DETERMINATION BY SIREN TESTING.
Rept. for Mar 60-Oct 61, on Dynamic Problems in Flight Vehicles,
by Preston W. Smith, Jr. and Charles I. Malme. May 62, 87p. incl. illus. tables, 32 refs.
(Contract AF 33(616)7147, Proj. 1370)
(ASD TR 61-639) Unclassified report

DESCRIPTORS: *Airframes, *Beams, *Metal plates, *Jet engine noise, *Fatigue (Mechanics), Life expectancy, Sound generators, Tests, Test methods, Acoustics, Aluminum, Simulation, Mathematical prediction.

Experimental and theoretical researches were made on the problem of predicting the fatigue life of a resonant structure exposed to jet noise by testing it with intense sound from a siren. One panel design of Alclad 2024 aluminum was tested to fatigue with constant-amplitude and variable amplitude siren sounds and with jet noise. A close correlation of all three results was found. A comparison was also made of fatigue lifetimes of a resonant cantilever beam, of plain 2024 aluminum, measured with constant excitation amplitude (pure tone) and with random excitation. Random lifetimes were shorter than predictions from constant-amplitude data. (Author)

AD-278 383 Div. 1, 26, 2
(TISTA/VGW) OTS price $10.10

Dewey and Almy Chemical Co., Cambridge, Mass.
BALLOON, HIGH-ALTITUDE, FAST-RISING.
Final rept., 15 June 60-29 June 62,
by Neal F. Kelly. 29 June 62, 120p. incl. illus. tables.
(Contract DA 36-039-sc-84944)
Unclassified report

DESCRIPTORS: *Meteorological balloons, Synthetic rubber, Design, High altitude, Manufacturing methods, Production, Model tests, Aerodynamics, Drag, Lift, Surface properties, Flight testing, Wind tunnel models, Spheres, Tests.

The design, fabrication, and testing are reported of a neoprene meteorological balloon capable of rapid rising to high altitude.

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-277 996 Div. 2
(TISTP/FR) OTS price $8.60

Free U., Berlin (Germany).
PRELIMINARY DAILY NORTHERN HEMISPHERE 30-MILLIBAR SYNOPTIC WEATHER MAPS OF THE YEAR 1962. PART I. JANUARY-MARCH.
Quarterly technical status rept. no. 1,
by Karin Labitzke-Behr, Zdravko Petkovsek and Richard Scherhag. 1962, 98p. incl. illus. 4 refs.
(Contract DA 91-591-EUC-2148)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Meteorological charts, Stratosphere, Northern hemisphere, Barometric pressure, Wind, Temperature, Diurnal variations, Periodic variations.

AD-278 069 Div. 2
(TISTP/FR) OTS price $7.60

Weather Forecasting Research Center, U. of Chicago, Ill.
AN INVESTIGATION OF COLORADO CYCLONES,
by William L. Schallert. June 62, 68p. incl. illus. tables, 31 refs. (Scientific rept. no. 7)

***UNDERGROUND STRUCTURES**
STRESSES

THE RESPONSE OF UNDERGROUND CYLINDRICAL TUNNEL AND SILO LININGS TO BLAST-INDUCED LOADINGS. A THEORETICAL METHOD FOR ESTIMATING GROUND SHOCK.
AD-278 003 DIV. 13

***USSR**
MEDICAL RESEARCH

THE EFFECTS OF RADAR ON THE HUMAN BODY (RESULT OF RUSSIAN STUDIES).
AD-278 172 DIV. 16

***VACUUM PUMPS**

CROSS STRESSES IN THE FLOW OF DIFFERENT GASES.
AD-278 216 DIV. 9

***VALVES**
RADIATION EFFECTS

COMPONENTS AND MATERIALS FOR USE IN SPACE PROPULSION SYSTEMS WERE TESTED FOR STABILITY UNDER SPACE CONDITIONS.
AD-278 055 DIV. 12

***VAPOR PLATING**

ACTIVITY INVOLVED (1) VAPOR DEPOSITION OF TUNGSTEN ONTO POLARIS NOZZLE COMPONENTS; (2) DEPOSITION OF HIGH-PURITY W FROM TUNGSTEN HEXAFLUORIDES ONTO A W-BERYLLIA HERM NOZZLE INSERT AND A STANDARD GRAPHITE TEST NOZZLE INSERT; AND (3) BASIC INVESTIGATIONS OF W VAPOR-DEPOSITED PROCESS VARIABLES.
AD-278 010 DIV. 26

MEASUREMENTS WERE MADE OF THE CONCENTRATION OF ADSORBED AG REQUIRED FOR NUCLEATION OF AG CRYSTALS TO OCCUR ON A W SUBSTRATE. EMF MEASURMENTS WERE MADE ON AU-NI ALLOYS; TABULATED VALUES OF THE ACTIVITIES, FREE ENERGIES, ENTROPIES AND ENTHALPIES OF MIXING ARE GIVEN.
AD-278 068 DIV. 17

***VEGETABLES**

TO DETERMINE THE EFFECTS OF RADIATION AS A FOOD PRESERVATION. PACKAGED DRIED FRUITS AND VEGETABLES WERE SUBJECTED TO 0.1 TO 2.0 MRAD DOSES. RADIATION DOSES OF 0.5 MRADS OR LESS HAD HIGHER ACCEPTABILITY. THE 1.0 MRAD DOSE INDUCED DISCOLORATION. TENDERNESS MEASURED BY SHEAR PRESS METHOD.
AD-278 182 DIV. 16

***VENTILATION**

THE DESIGN, CONSTRUCTION, AND MODEL TESTS OF A 1-TON WATER-TO-WATER THERMOELECTRIC COOLER FOR SERVICE ABOARD SUBMARINES ARE DESCRIBED.
AD-278 351 DIV. 13

***VISCOSITY**

THE ISOTHERMAL QUASI-STATIC LINEAR THEORY OF HOMOGENEOUS AND ISOTROPIC VISCOELASTIC SOLIDS IS DISCUSSED.
AD-278 376 DIV. 9

***VOLTAGE REGULATORS**

A TRANSISTORIZED GENERATOR VOLTAGE CONTROL FOR A CYCLOTRON MAGNET.
AD-278 212 DIV. 8

***VOLTMETERS**
DESIGN

RESEARCH WAS CONDUCTED ON A HIGH SPEED, RUGGEDIZED, MINIATURE, DIGITAL VOLTMETER UTILIZING THE FIELD EFFECT TECHNIQUE TO ACCOMPLISH ANALOG TO DIGITAL CONVERSION.
AD-278 067 DIV. 30

***VORTICES**

VORTEX SHEDDING, TRANSITION AND GROWTH OF LUMINOUS WAKES BEHIND SPHERES AT MACH 15 TO 25.
AD-278 269 DIV. 9

***WAKE**

VORTEX SHEDDING, TRANSITION AND GROWTH OF LUMINOUS WAKES BEHIND SPHERES AT MACH 15 TO 25.
AD-278 269 DIV. 9

***WAKE**
MATHEMATICAL ANALYSIS

THREE-DIMENSIONAL EFFECTS IN VISCOUS WAKES.
AD-278 129 DIV. 9

***WATER**

THE STATISTICAL THEORY OF THE CONDENSATION OF WATER VAPOR IS TREATED.
AD-278 248 DIV. 25

***WATER HEATERS**

EVALUATION OF HEATING DEVICES FOR THE QUICK-SERVE MEALS. TESTS OF A CARBON HEATER AND A MODULAR COMBUSTION HEATER.
AD-277 972 DIV. 29

***WAVE TRANSMISSION**

THE MODAL SPECTRUM OF A LOSSLESS, HOMOGENEOUS AND ISOTROPIC PLANAR PLASMA IS SHOWN TO CONTAIN CONTRIBUTIONS FROM SURFACE WAVES AND COMPLEX MODES IN ADDITION TO THE USUAL CONTINUOUS SPECTRUM CHARACTERISTICS OF OPEN STRUCTURES.
AD-278 127 DIV. 8

MF FREQUENCIES FOR EXO- AND ENDO-IONOSPHERIC COMMUNICATIONS EMPLOYING DUCTING.
AD-278 296 DIV. 8

***WEAPONS**

CRITERIA FOR DETERMINING TESTING AND MONITORING POLICIES.
AD-278 006 DIV. 15

***WEATHERPROOFING**

EIGHT COATING SYSTEMS WERE EVALUATED AS PROTECTIVE COATING SYSTEMS FOR STEEL PILES. COATED SHEET AND H PILES WERE DRIVEN IN THE SURF AT PONT MUENEME AND EXPOSED 12 TO 30 MONTHS. A VINYL MASTIC COATING WAS THE MOST ECONOMICAL PROTECTION.
AD-278 356 DIV. 14

***WELDED JOINTS**

TESTS TO DETERMINE THE RELIABILITY OF WELDED ELECTRONIC CONNECTIONS ARE REPORTED. THE MATERIALS INVOLVED NI RIBBON WELDED TO #24 BUSS WIRE, NI STRAP TO KOVAR TRANSISTOR WELDS, NI RIBBON TO 1/4 WATT RESISTOR LEADS. NO FAILURES OR GROSS JOINT DETERIORATION OCCURRED.
AD-278 350 DIV. 8

***WELDING**
EXPLOSIVES

EXPLOSIVE WELDING OF AL, BRASS, CU, STEEL, AND TA IN VARIOUS COMBINATIONS OF SINGLE AND MULTIPLE WELDS IS DISCUSSED. WORK-HARDENING DATA AND MICROSTRUCTURE INDICATE THE METALLURGICAL PROPERTIES OF THESE WELDS OF SIMILAR AND DISSIMILAR METAL COMBINATIONS.
AD-278 334 DIV. 17

***WELDS**

DETERMINATION OF CAUSES OF CRACKING IN WELDING AGE HARDENABLE HIGH TEMPERATURE ALLOYS (A-286 WELDMENTS), AND STRAIN AGED OF RENE 41 AND INCONEL X.
AD-278 259 DIV. 17

TESTS TO DETERMINE THE RELIABILITY OF WELDED ELECTRONIC CONNECTIONS ARE REPORTED. THE MATERIALS INVOLVED NI RIBBON WELDED TO #24 BUSS WIRE, NI STRAP TO KOVAR TRANSISTOR WELDS, NI RIBBON TO 1/4 WATT RESISTOR LEADS. NO FAILURES OR GROSS JOINT DETERIORATION OCCURRED.
AD-278 350 DIV. 8

EXPLOSIVE WELDING OF AL, BRASS, CU, STEEL, AND TA IN VARIOUS COMBINATIONS OF SINGLE AND MULTIPLE WELDS IS DISCUSSED. WORK-HARDENING DATA AND MICROSTRUCTURE INDICATE THE METALLURGICAL PROPERTIES OF THESE WELDS OF SIMILAR AND DISSIMILAR METAL COMBINATIONS.
AD-278 334 DIV. 17

***WIDE FIELD CAMERAS**

CONSTRUCTION AND FLIGHT TESTING OF THE F-415A ROTARY-PRISM PANORAMIC AERIAL CAMERA ARE REPORTED.
AD-277 990 DIV. 24

***WIND TUNNEL NOZZLES**

ESTIMATED PERFORMANCE AT A HYPERSONIC WIND TUNNEL (NOZZLE EXIT DIAMETER IS 30 INCHES) INCLUDING CURVES OF REYNOLD'S NUMBERS, SUPERSATURATION, MASS FLOW RATES, SHOCK RECOVERY, RUNNING TIMES, AND VACUUM SYSTEM CHARACTERISTICS.
AD-277 952 DIV. 1

***WINDSHIELDS**

THEORETICAL AND EXPERIMENTAL ANALYSIS OF STRESSES AND STRAINS IN GLASS-REINFORCED PLASTIC WINDSHIELDS.
AD-278 096 DIV. 14

***X-RAY DIFFRACTION ANALYSIS**

A GENERALIZATION OF ZACHARIASEN'S DYNAMICAL THEORY IS DERIVED FOR THE CASE OF DISTORTED OR NON-PERFECT CRYSTALS AND NON-PLANE WAVES.
AD-278 109 DIV. 25

***X-RAY PHOTOGRAPHY**

A FEASIBILITY STUDY WAS MADE OF HIGH INTENSITY FLASH X-RAY SOURCES WHICH WOULD USE THERMIONIC AND FIELD (TF) EMISSION OF ELECTRONS. DEVELOPMENT OF A MULTICHANNEL PULSED X-RAY SYSTEM WITH TF TUBES CAPABLE OF HIGH INTENSITY FLASHES IS DESCRIBED.
AD-278 061 DIV. 24

***X RAYS**

A FEASIBILITY STUDY WAS MADE OF HIGH INTENSITY FLASH X-RAY SOURCES WHICH WOULD USE THERMIONIC AND FIELD (TF) EMISSION OF ELECTRONS. DEVELOPMENT OF A MULTICHANNEL PULSED X-RAY SYSTEM WITH TF TUBES CAPABLE OF HIGH INTENSITY FLASHES IS DESCRIBED.
AD-278 061 DIV. 24

A GENERALIZATION OF ZACHARIASEN'S DYNAMICAL THEORY IS DERIVED FOR THE CASE OF DISTORTED OR NON-PERFECT CRYSTALS AND NON-PLANE WAVES.
AD-278 109 DIV. 25

***ZONE MELTING**

SPECIMENS OF ELECTRON BEAM ZONE-REFINED NB WERE SUBJECTED TO TENSILE TESTS BETWEEN 373 AND 4.2 K. POLYCRYSTALLINE AND SINGLE CRYSTALS WERE TESTED. SPECIMENS WERE EITHER DEFORMED TO FRACTURE OR THE TEMPERATURE WAS CHANGED TO MEASURE REVERSIBLE FLOW STRESS.
AD-278 051 DIV. 17

DESCRIPTORS: *Errors, *Orbital flight paths, *Astronomical data, Satellites, Tracking, Mathematical prediction, Least squares method, Probability, Statistical analysis.

The differential correction procedure used for astrodynamical data reduction is shown to be a method of solution of the unweighted least squares problem. A formula for the covariance matrix of the parameters estimated by this procedure is then found, by considering the generalized least squares problem. It is shown that this matrix has a larger determinant than does the matrix obtained by solving the rigorous least squares problem. (Author)

AD-278 367 Div. 2
(TISTP/FR) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
REACTIONS OF IONS IN THE UPPER ATMOSPHERE,
by W. W. Hunt, Jr. Mar 62, 14p. incl. tables, 47 refs. (GRD research note no. 80; AFCRL 62-274)
Unclassified report

Presented at the Symposium on Upper Atmosphere Chemistry on Mar 21 to 30, 1961 during the St. Louis Meeting of the American Chemical Society.

DESCRIPTORS: *Recombination reactions, *Ions, Gas ionization, Electrons, Upper atmosphere.

This review of homogeneous gas phase reactions of positive ions with electrons and with negative ions, and the reactions characteristic of negative ions, emphasizes the rates of individual processes or process types important in the upper atmosphere. Consideration is restricted to thermal energy processes resulting in a change in chemical identity of the interacting species. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-278 359 Div. 3, 4
(TISTM/EJH) OTS price $5.60

Brooklyn Coll., N. Y.
DEVELOPMENT OF FLUORESCENT COMPOUNDS AND REDOX INDICATOR DYES.
Final rept.,
by Nicholas D. Cheronis. Oct 61, 52p. incl. illus. tables, 18 refs.
(Contract DA 18-064-404-cml-495)
Unclassified report

DESCRIPTORS: *Dyes, *Fluorescent dyes, *Sulfur dyes, *Biological stains, *Chemical indicators, *Bacterial aerosols, *Bacteria, *Detection, Fluorescence, Chemical properties, Physical properties, Synthesis, Molecular structure, Polycyclic compounds, Heterocyclic compounds, Phthalic acids, Resorcinol, Naphthalenes, Azoles, Sulfur compounds, Benzenes.

Contents:
Experimental methods (phthaleins, sulfonphthaleins, fluoresceins, tetrazolium salts)
Preparation of fluorescent compounds and screening
Synthesis of compounds having greater fluorescent intensity than fluorescein (complex fluoresceins, naphtholfluorescein)
Compounds with large fluorescence intensity for detection of organic compounds by tagging (sulfonation of naphtholfluorescein, nitration of naphtholfluorescein)
Preparation, purification and determination of fluorescent compound activity
Preparation of tetrazolium salts
Physical constants and characterizations of formazans and tetrazolium salts

4. CHEMISTRY

AD-278 000 Div. 4
(TISTA/SEB) OTS price $1.10

Noyes Chemical Lab., U. of Illinois, Urbana.
NMR SPLITTINGS DUE TO MOLECULAR ASYMMETRY,
by H. S. Gutowsky. 1 June 62, 6p. incl. illus.
(Technical rept. no. 52)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Nuclear magnetic resonance, *Ethanes, Organic compounds, Fluorides, Bromides, Chlorides, Mathematical analysis, Theory, Temperature, Chemical equilibrium, Molecular structure, Configuration, Molecular rotation.

An analysis is given of the relative effects of molecular asymmetry and differences in conformational populations in causing nuclei to be magnetically non-equivalent. Primary importance is attached to the nature of the molecular asymmetry. The temperature dependence of the chemical shift between Fa and Fb, in CFaFbBrCFBrCl, is used to show that there is a splitting, an asymmetry effect, which persists when the three rotamers have the same population. (Author)

AD-278 003 Div. 4, 16
(TISTB/AW) OTS price $2.60

Massachusetts Coll. of Pharmacy, Boston.
THE SYNTHESIS OF BETA-MERCAPTOETHYLAMINES OF VARYING BASICITY AND LIPOSOLUBILITY.
Annual progress rept., June 61-June 62,
by William O. Foye. 25 June 62, 25p. incl. tables, 18 refs.
(Contract DA 49-193-md-2029)
Unclassified report

DESCRIPTORS: *Radioprotective drugs, *Amines, Guanidines, Ethyl radicals, Alkyl radicals, Organic acids, Amino acids, Carbamates, Pyrimidines, Thiourea, Chelate compounds, Carbon, Sulfides, Solubility, Toxicity, Mice, Esters, Thio radicals, Synthesis.

Derivatives of 2-mercaptoethylamine (MEA) and 2-mercaptoethylguanidine (MEG) were synthesized to improve the toxicities and solubility characteristics of the parent compounds for radiation protection. This was accomplished mainly by alkylation with straight chain alkyl groups, and by acylation with straight chain aliphatic or alpha-amino acids. Dithiocarbamates of these and other amines were also synthesized for antiradiation screening. The structure of the carbon disulfide adduct of MEG was investigated. Several other types of mercapto-containing compounds were synthesized as well: mercaptoethyl and dithiocarbamate derivatives of aminopyrimidines and amino-as-triazines, nitrogen derivatives of mercaptobiacetyl, and bithioureas. Metal chela-

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

(Contract AF 19(604)7230, Proj. 8641)
(AFCRL 62-642) Unclassified report

DESCRIPTORS: *Cyclones, Colorado, Mountains, Wind, Barometric pressure.

Cyclones which have their origin in what synoptic meteorologists know as the Colorado region are of considerable interest to practicing forecasters, particularly during the colder part of the year when cyclones of great intensity may originate in that general area. The general behavior of a large number of Colorado developments are investigated with a view to identifying sequences of atmospheric structures which precede or accompany these developments. Such knowledge might result in improved forecasting procedures. (Author)

AD-278 099 Div. 2
(TISTP/FR) OTS price $4.60

Air Force Cambridge Research Labs., Bedford, Mass.
A GENERAL SUMMARY OF SACRAMENTO PEAK WEATHER AUGUST 1954 THROUGH DECEMBER 1961,
by Howard L. DeMastus. May 62, 36p. incl. illus. tables, 78 refs. (GRD Research notes no. 82; Rept. no. AFCRL 62-478)
Unclassified report

DESCRIPTORS: *Meteorological data, Astronomical observatories, Mountains, New Mexico, Precipitation, Barometric pressure, Temperature, Wind.

A general summary of weather conditions observed at the Sacramento Peak Observatory, Sunspot, New Mexico from August 1954 through January 1962 shows three rather distinct periods of annual precipitation. Median values of atmospheric pressure during successive 4-day intervals indicate the passage of winter cyclonic depressions and the seasonal influence of the general pressure patterns. Statistical analysis of temperature records provides mean maximum and minimum values, the departures from the means, and a chronological history of daily maximum and minimum temperatures. Analysis of wind speed records yields total hours during given months where the wind maintains average speeds from 30 mph through 50 mph, by 5-mile increments. (Author)

AD-278 152 Div. 2
(TISTP/FR) OTS price $18.50

Wright Instruments, Inc., Vestal, N. Y.
A SURVEY FOR NOL OF HIGH ALTITUDE ATMOSPHERIC TEMPERATURE SENSORS AND ASSOCIATED PROBLEMS.
Final rept.,
by William Finley Wright. 1961, 1v. incl. illus. tables, refs.
(Contract N-60921-6136)
Unclassified report

DESCRIPTORS: *Atmosphere, *Temperature sensitive elements, *Thermistors, *Temperature, Resistance thermometers, Sound, Measurement, Radiosondes.

The theoretical and practical aspects of upper air temperature measurements are detailed. An explanation of the structure of the atmosphere, and a discussion of the problems that arise in its measurement are given. (Author)

AD-278 163 Div. 2, 12
(TISTA/GEC) OTS price $4.60

Aerospace Corp., El Segundo, Calif.
ON ALIGNMENT OF SUN, EARTH, AND SATELLITE,
by P. O. Bell. 25 Jan 62, 36p. incl. illus. tables (Rept. no. TDR-930(2352)TR-1)
(Contract AF 04(647)930)
(DCAS TDR 62-7) Unclassified report

DESCRIPTORS: *Celestial mechanics, *Orbital flight paths, Sun, Earth, Satellite vehicle trajectories, Launching, Mathematical analysis, Digital computers, Satellite vehicles.

The results are reported of an investigation of the relations among the launch parameters of an earth satellite and the time and position of alignment of the sun, the earth, and the satellite. The effects of variations of the launch conditions upon the satellite's time of transit across the solar disc are determined. (Author)

AD-278 225 Div. 2
(TISTP/FR) OTS price $10.10

Munich U. (Germany).
INVESTIGATION OF THE INFRARED EMISSION SPECTRUM OF THE ATMOSPHERE AND EARTH.
Summary rept.,
by Hans-Jurgen Bolle, Firtz Moller and Heinrich Quenzel. Mar 62, 115p. incl. illus. tables, 8 refs. (Technical note no. 1)
(Contract AF 61(052)488)
(AFCRL 62-673) Unclassified report

DESCRIPTORS: *Infrared radiation, *Infrared spectroscopy, Sky, Atmosphere, Water vapor, Measurement, Infrared spectrophotometers.

A new, improved interference-filter actinograph is described, and results of the following investigations are reported: (1) sky emission measurements in the 15 to 26 micron region from Jungfraujoch (Switzerland; altitude 3570 m) and S. Agata (Italy: altitude 455 m); and (2) calibration and evaluation problems of interference-filter actinograph measurements. A list of the measurements made during 1960/61 is given. (Author)

AD-278 238 Div. 2
(TISTP/FR) OTS price $1.60

Naval Weapons Lab., Dahlgren, Va.
THE GRAVITATIONAL FIELD OF THE EARTH: ZONAL HARMONICS FROM TRANSIT 1B AND TRANSIT 2A DATA,
by M. J. Shelkey. 8 May 62, 18p. incl. illus. tables, 12 refs. (NWL rept. no. 1807)
Unclassified report

DESCRIPTORS: *Gravity, Harmonic analysis, Satellite vehicles, Satellite vehicle trajectories.

Values of the gravitational harmonic coefficients J2, J3, J4, J5 and J6 are given. The odd harmonics were deduced by analysis of the variation of eccentricity of the Transit 1B and 2A satellites. The even harmonics were deduced by analysis of the motion of the node of the Transit 1B and 2A satellites and of the motions reported by Kozai in reference (a) for the Vanguard I, Vanguard III and Explorer VII satellites. The constants are compared with those reported by several other researchers, and the effects of all available sets of constants in reducing the biases observed in the Transit 1B and 2A satellites are given. (Author)

AD-278 266 Div. 2, 15
(TISTP/AW) OTS price $3.60

RCA Defense Electronic Products, Burlington, Mass.
THE LINEAR ERROR ANALYSIS OF A DIFFERENTIAL CORRECTION PROCEDURE,
by Milton Grossberg. Nov 61, 36p. incl. 6 refs.
(Contract AF 19(604)8041)
(ESD TDR 62-39) Unclassified report

Ketones, Aldehydes, Amides, Acetophenones, Carbonyl radicals, Acetones, Dehydration, Catalysts, Aluminum compounds, Oxides, Chemical reactions, Grignard reactions, Separation, Solvent extraction, Esters, Methyl radicals, Synthesis.

Emphasis was placed upon the preparation of bromine-substituted polyphenyls and various intermediates as well as new methods of synthesis of this general class of compounds. Physical properties such as spectra (IR and UV) and melting points were determined. In the course of the research, a new and interesting reaction was explored: the catalytic dehydration of carbonyl-containing-compounds in the vapor phase over alumina. Also a preliminary report is made on a method for the separation and determination of purity of various polyphenyl-type compounds. This method depends upon the solubility behavior of a substance as temperature and solvent composition are simultaneously changed. (Author)

AD-278 123 Div. 4, 25
(TISTE/CAM) OTS price $1.75

Armour Research Foundation, Chicago, Ill.
ORGANIC SEMICONDUCTORS.
Final rept., 15 Mar 59-14 Mar 62,
by C. Sosnovsky. Mar 62, 56p. incl. illus. tables, 16 refs. (Rept. no. ARF 3142-12)
(Contract AF 49(638)576, Proj. 9762)
(AFOSR-2663) Unclassified report

DESCRIPTORS: *Semiconductors, Complex compounds, Organic compounds, Conductivity, Dielectric properties, Spectrographic analysis, Photoconductivity, Polarization, Space charges, Temperature, Voltage, Measurement, Quinones, Polymers, Hydrocarbons, Single crystals, Thin films, Fluorenones, Anthracenes, Theory.

The dielectric, spectroscopic, and photoconductive properties of selected addition compounds and their donor and acceptor components were investigated. The study of dielectric properties entailed measurements of dielectric losses, dielectric constants, and dielectric resistivities on compressed powders. The data indicate that polarization effects caused by migrating charges are probably responsible for the high loss regions found at low frequencies. At higher frequencies bimodal temperature-dependent loss curves were found for some addition compounds. The spectral response of photoconduction in single crystals of two addition compounds and their components was measured as a function of field direction, applied voltage, light intensity, and time of illumination. The results show that space-charge build-up effects set up by travelling charge carriers dominate the conduction mechanism. The correlation of spectral response data with spectroscopic data was variable. (Author)

AD-278 124 Div. 4, 16
(TISTB/AW) OTS price $1.25

Monsanto Research Corp., Everett, Mass.
SYNTHESIS OF ANTIRADIATION DRUGS.
Annual progress rept., 1 Apr 61-31 Mar 62,
by Robert J. Wineman, Morton H. Gollis and others. 20 July 62, 34p. incl. tables, 26 refs.
(Contract DA 49-193-md-2109)
Unclassified report

DESCRIPTORS: *Radioprotective drugs, *Amines, *Thiols, Synthesis, Ethylenes, Sulfides, Epoxides, Halides, Aliphatic compounds, Alcohols, Ethyl radicals, Thio radicals, Salts, Chlorides, Hydrochloric acid.

Forty-eight compounds were synthesized and evaluated as potential antiradiation drugs. These compounds were mainly N-substituted derivatives of 2-aminoethanethiol and were supplied as the hydrochloride salts. The synthetic methods used were: (1) thiolethylation of amines and alkanolamines with ethylene sulfide; (2) amination of epoxides and alpha, omega-alkylene dihalides with 2-(Benzylthio)ethylamine, followed by debenzylation; and (3) alkylation of alkanolamines with benzyl 2-chloroethyl sulfide, followed by debenzylation. A study of the reaction variables in the ethylene sulfide thiolethylation of a simple aliphatic amine (n-hexylamine) was begun. The data indicate that high amine:episulfide molar ratios and long reflux periods favor formation of the monothiolethylated product in good yield. (Author)

AD-278 160 Div. 4
(TISTM/EJH) OTS price $3.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
METHODS OF MICROANALYSIS V. OXYGEN FLASK COMBUSTION OF CHEMICAL AGENTS,
by John M. Corliss. Apr 62, 32p. incl. illus. tables, 20 refs. (Rept. no. CRDLR 3130)
Unclassified report

DESCRIPTORS: *Microanalysis, *Sulfur, *Chlorine, *Bromine, *Iodine, Chemical warfare agents, Chemical analysis, Volumetric analysis, Titration, Combustion, Determination.

The oxygen flask technique of sample combustion was applied to products produced in Chemical Corps research. Evaluation was obtained through selected and modified microvolumetric procedures. Results were obtained for sulfur and halogen elements. The ranges of analytical recovery for each individual element or procedure were 100% ± 0.29% for the average recovery; less than or equal to 0.35 for the average deviation; less than or equal to 0.28 for the standard deviation. A favorable comparison was found by contrasting these quantities with similar ones obtained by other methods. Optimum design parameters for the flask are considered. (Author)

AD-278 206 Div. 4, 25
(TISTM/EJH) OTS price $2.60

Harvard U., Cambridge, Mass.
STRUCTURE OF Cu2B10H10,
by Robert D. Dobrott and William N. Lipscomb. 6 June 62, 21p. illus. 21 refs.
(Contract Nonr-186642, Proj. NR 052-178)
Unclassified report

DESCRIPTORS: *Decaboranes, *Copper compounds, *Boron compounds, *Crystal structure, Hydrides, Ions, Valence, X-ray diffraction analysis, Lattices, Nuclear magnetic resonance, Chemical bonds, Metallic compounds.

An X-ray diffraction study of the crystal structure of Cu2B10H10 shows that the earlier proposal that the B10H10(--) ion has D sub 4d symmetry is correct, and further establishes the covalent nature of the interactions of Cu superscript I with B atoms forming the edges of the polyhedron. There are 8 Cu2B10H10 in a unit cell having dimensions a = 10.11, b = 11.36 and c = 14.50, and the space group is Pcab. Bonds within a tetragonal pyramid are 1.73 (to apex) and 1.86 Angstroms in length, while B-B bonds between the tetragonal pyramids are 1.81 Angstroms in length. The closest Cu...B distances range from 2.14 to 2.33 Angstroms in length. (Author)

tion reactions of some of the dithiocarbamates were studied in an attempt to relate metal ion chelation with antiradiation activity. Stability constants were not obtained, but a relation between metal ion chelation and antifungal activity was observed. A majority of the compounds for which antiradiation results were reported during the past year gave protection in mice. (Author)

AD-278 020 Div. 4, 25
(TISTM/REB) OTS price $1.60

Queens U., Belfast (Gt. Brit.).
DIELECTRONIC RECOMBINATION TO NORMAL NITROGEN AND OXYGEN IONS,
by D. R. Bates. 1961, 11p.
(Grant 61-16)
(AFCRL 62-661) Unclassified report

DESCRIPTORS: *Recombination reactions, *Nitrogen, *Oxygen, Mathematical analysis, Electrons, Atomic energy levels, Ions.

Calculations are carried out on dielectronic recombination to N(+) (3-P) and O(+) (4-S) ions. The rate coefficients at an electron temperature of 2000K are 1.6 x 10 to the -13th and 2.5 x 10 to the -14th cc/sec, respectively. These values are much less than the corresponding values for radiative recombination. (Author)

AD-278 052 Div. 4
(TISTM/EJH) OTS price $14.00

Monsanto Research Corp., Everett, Mass.
SYNTHESIS OF 5-ALKYLRESORCINOLS.
Final rept., 1 June 60-31 May 62,
by Stanley D. Koch, James L. Dever, and Paul F. Donovan. 31 May 62, 189p. incl. illus. tables, 99 refs.
(Contracts DA 18-108-405-cml-807 and DA 18-108-cml-6632)
Unclassified report

DESCRIPTORS: *Resorcinol, *Octanes, *Phenols, *Alkyl radicals, Alkoxy radicals, Methyl radicals, Hydroxides, Phenyl radicals, Synthesis, Chemical reactions, Grignard reactions, Grignard reagents.

A number of synthetic routes to 2-(3,5-dihydroxyphenyl)-3-methyloctane were investigated. The most practical route starts from 1,3,5-trichlorobenzene, which is converted in two steps to 3,5-dimethoxyphenylmagnesium chloride. This Grignard reagent is reacted with 2-methylheptanonitrile, and the resulting ketone is reacted with methylmagnesium halide to give 2-(3,5-dimethoxyphenyl)-3-methyloctanol-2. This carbinol is dehydrated, reduced, and cleaved to produce the desired resorcinol. Other routes and variations in individual steps were also investigated and detailed comparisons of their merits are included. The synthesis of six related alkylresorcinols was also investigated. Two of these were prepared: 2-(3,5-dihydroxyphenyl)-3,4-dimethyloctane and 2-(3,5-dihydroxyphenyl)-3,3-dimethyloctane. A key precursor for three of the others was prepared. (Author)

AD-278 056 Div. 4, 14
(TISTM/EJH) OTS price $1.60

Olin Mathieson Chemical Corp., New Haven, Conn.
BORON POLYMERS.
Quarterly progress rept., 1 Mar-31 May 62,
by T. L. Heying and H. A. Schroeder. 31 May 62, 11p. 5 refs. (Technical rept. no. 8)
(Contract Nonr-339500, Proj. NR 356-431)
Unclassified report

DESCRIPTORS: *Polymers, *Heat resistant polymers, *Decaboranes, *Pentaboranes, *Boron compounds, Chemical reactions, Hydrogen compounds, Hydrides, Borohydrides, Organoboranes, Phosphines, Phenyl radicals, Chlorides, Quaternary amines, Azides, Phosphorus compounds, Coatings, Films, Complex compounds, Synthesis, Polymerization.

Pentaborane enters into a variety of reactions which are, in general, complex and sensitive to minor variations in stoichiometry and method. Exploratory experiments with B10H10= derivatives showed that B10H9- ligand compounds can be formed by reactions of the di-cation with diarylchlorophosphine. Improvements in the preparation of some of the difunctional B10H12 ligand compounds previously reported were made. Three polymers arising from these monomers were prepared. Results of some preliminary evaluations are encouraging in that films and coatings can be made. Phenylphosphine and boron trichloride enter into a vigorous but ill-defined reaction apparently involving the formation of a -P-B- polymer. In allied studies it seems that phenyldichlorophosphine and diborane will undergo hydrogen-chlorine interchange. (Author)

AD-278 106 Div. 4
(TISTM/EJH) OTS price $4.60

Iowa State U. of Science and Tech., Ames.
(No title).
Final rept., 1 Nov 58-31 Oct 61,
by Ernest Wenkert. 31 Oct 61, 43p.
(Contract DA 18-108-405-cml-269)
Unclassified report

DESCRIPTORS: *Indoles, *Alkaloids, *Molecular structure, *Stereochemistry, Synthesis, Chemical reactions, Reduction, Pyrolysis, Spectrographic analysis, Strychnine.

The absolute configuration of yohimbine: Chemical approaches to the solution of yohimbine structures by degradation to products of known stereochemistry are discussed. The absolute configuration of strychnine: Attempts to convert strychnine to dihydrocorynantheane are reported. Gelsedine: The alkaloid gelsedine was shown to be demethoxygelsemicine. A chemical and spectral study of oxindole model compounds is discussed. A flavopereirine synthesis: The reactions of several N-(beta-(3-indolyl-)ethyl-)pyridinium salts with various metal hydrides were investigated. Their use in the synthesis of the alkaloid flavopereirine is reported. A synthesis of erythrocentaurin: The chemistry of hemimellitic acid was investigated. The homologation and reduction of some carboxyphthalides and pyrolysis and reduction of others were studied. Acylation of dimethyl 2-methylisophthalate and its dinitrile was investigated; the chemistry of the resulting isocoumarin and isocarbostyril is discussed. The conversion of the isocoumarin derivative into erythrocentaurin is described.

AD-278 110 Div. 4
(TISTM/EJH) OTS price $2.75

Maryland U., College Park.
THE SYNTHESIS AND PROPERTIES OF SOME POLYPHENYLS AND BROMINE SUBSTITUTED POLYPHENYLS.
Final technical rept. on New Chemical Systems and Methods of Synthesis,
by G. Forrest Woods. Mar 62, 121p. incl. illus. 31 refs.
(Contract AF 33(616)5063, Proj. 7023)
(ARL 62-306) Unclassified report

DESCRIPTORS: *Polymers, *Phenyl radicals, *Isomer, *Cyclohexanones, Chemical properties, Acetic anhydrides, Dienes, Bromides, Benzenes,

multiple of this. Crystallographic studies have been concentrated on the copper nitrate-nitromethane adduct, and on basic beryllium nitrate. (Author)

AD-278 360 Div. 4, 16
(TISTB/CCH) OTS price $1.10

Army Chemical Research and Development Labs., Army Chemical Center, Md.
CONCERNING A CLINICAL TEST FOR BORON HYDRIDE EXPOSURE,
by William A. Groff and Ludwig A. Sternberger. Sep 61, 9p. incl. table, 6 refs. (Rept. no. CRDLR 3087)
Unclassified report

DESCRIPTORS: *Toxicity, *Boron compounds, *Decaboranes, Boric acids, Borates, Hydrides.

Investigations of the behavior of decaborane, boric acid, and borate under various conditions of oil-water distribution indicate that hydroborane is converted rapidly to products that are not recoverable by a method reported by others to reveal boron hydride exposure. The toxicity of decaborane is not caused by the deposition of decaborane, per se. (Author)

5. COMMUNICATIONS

AD-278 154 Div. 5, 12, 8
(TISTE/CRJ) OTS price $7.60

Sylvania Electric Products, Inc., Buffalo, N. Y.
ANTENNA AND SYSTEM TECHNIQUES FOR SHF COMMUNICATIONS LINK, VOLUME III.
Study rept. on Phase 1.
15 Feb 62, 1v. incl. illus. table (Rept. no. 83-5-5.0-20, vol. 3)
(Contract AF 33(616)8430)
Unclassified report

DESCRIPTORS: *Satellite vehicles, *Radio communication systems, *Data transmission systems, Antennas, Satellite vehicle antennas, Tracking, Statistical analysis, Radio receivers, Probability, Signal-to-noise ratio, Lobing, Reduction, Errors, Communication systems, Superhigh frequency.

A continuation is presented of effort on antenna and system techniques for SHF communications links. Presented are system technique studies which include work on acquisition and tracking. Also presented are integration techniques. Also see vol. I (AD-330 020) and vol. II (AD-330 021).

AD-278 215 Div. 5, 12
(TISTE/CDM) OTS price $1.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
INVESTIGATION OF OPTICAL SPECTRAL REGIONS FOR SPACE COMMUNICATIONS.
Interim rept. no. 1, 1 Feb-30 Apr 62,
by R. A. Rollin, Jr. July 62, 17p. 5 refs. (Rept. no. 4968-1-P)
(Contract AF 33(657)7962)
Unclassified report

DESCRIPTORS: *Light communication systems, *Optical systems, *Communication equipment, *Light transmission, Sources, Modulators, Optical equipment, Lasers, Infrared radiation, Interference, Solar disturbances, Spaceships, Carbon arc lamps, Sun, Infrared photoconductors, Satellite vehicles, Infrared spectroscopy.

A study was initiated on the problem of background interference and on communications systems components for the optical spectral region. Literature searches were necessary to determine (a) the problems of space missions, (b) spectral descriptions and categories of background interferences, and (c) the most recent developments in communications systems components. The principle power loss in space communications is in beam divergence. The compilation of data on radiation from the sun, planets, and stars made it possible to categorize background interference. Analysis showed that, while sun is the best continuous, noncoherent source, there is as yet no practical system for utilizing it in space communications; intermittent, noncoherent sources, have greater peak spectral radiance than continuous sources but are limited in their modulation capabilities and thus have low information rate. Coherent sources (lasers) can be modulated externally, but so far laser capabilities are far short of theoretical predictions. Photoconductive detectors have a higher sensitivity and a narrower spectral response than thermal detectors. (Author)

6. DETECTION

No Entries

7. ELECTRICAL EQUIPMENT

AD-278 130 Div. 7, 14, 17, 12
(TISTB/CCH) OTS price $10.50

Aerospace Corp., El Segundo, Calif.
APPLIED RESEARCH MANAGEMENT ABSTRACT BULLETIN (PART I) ABSTRACTS 1-637 THROUGH 1-789.
Oct 61, 109p. 151 refs. (Rept. no. TDR-930(2701-01)TN-1, pt. 1, no. 4)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: *Bibliography, *Power supplies, *Indexes, Dry cells, Beryllium, Dosimeters, Fuel cells, Lubricants, Metals, Molybdenum, Plastics, Semiconductors, Solar cells, Seals, Titanium, Thermoelectricity, High temperature research, Thermionic emission, Materials, Radiation damage, Spaceships.

Part I, No. 4 is a bibliography, with abstracts, from unclassified literature presented on the subject of Flight Vehicle Power. Selected references in the field of materials are also included. All references are to primary sources. (Author)

AD-278 140 Div. 7
(TISTM/EJH) OTS price $10.10

Space Technology Labs., Inc., Los Angeles, Calif.
THE STATE OF DEVELOPMENT OF SILVER OXIDE-ZINC AND NICKEL-CADMIUM BATTERIES,
by R. W. Schult and W. T. Stafford. Feb 60, 116p. incl. illus. tables, 33 refs. (Rept. no.

Division 4 - CHEMISTRY

AD-278 208 Div. 4
(TISTM/EJH) OTS price $4.60

Harvard U., Cambridge, Mass.
MOLECULAR AND VALENCE STRUCTURES OF COMPLEXES OF CYCLOOCTATETRAENE WITH IRON TRICARBONYL,
by Brian Dickens and William L. Lipscomb.
6 June 62, 43p. incl. illus. tables.
(Contract Nonr-186642, Proj. NR 052-178)
Unclassified report

DESCRIPTORS: *Complex compounds, *Metalorganic compounds, *Iron compounds, *Butadienes, *Cyclooctatetraene, Monocyclic compounds, Carbonyl radicals, Single crystals, Crystal structure, Valence, Chemical bonds.

Structure determinations by X-ray diffraction methods indicate that Fe(CO)3 units are bonded to a butadiene type of residue in C8H8Fe(CO)3(I), and in (OC)3FeC8H8Fe(CO)3 (II), where the two Fe(CO)3 units are on opposite sides of the C8H8 ring. The dihedral C8H8 ring in (I) and tne chair C8H8 ring in (II) are previously unknown and unsuspected geometries for cyclooctatetraene. Crystals of (I) have symmetry Pnam, within experimental error, with four molecules in a unit cell defined by the parameters a = 6.54, b = 13.46, c = 11.50 angstroms. Crystals of (II) are of symmetry P2 sub 1/n, with four molecules in a unit cell which has parameters a = 12.52, b = 13.38, c = 8.86 and beta = 111 degrees. The bonding of Fe to the butadiene-like residues is discussed. (Author)

AD-278 229 Div. 4
(TISTM/EJH) OTS price $3.60

Monsanto Research Corp., Everett, Mass.
INNER SALTS.
Final technical rept.,
by Clifford N. Matthews, John S. Driscoll, and John E. Harris. 22 June 62, 34p. incl. illus. tables, 9 refs.
(Contract Nonr-337800, Proj. NR 055-430)
Unclassified report

DESCRIPTORS: *Phosphorus compounds, *Phosphonium radicals, *Salts, Metalorganic compounds, Phenyl radicals, Phosphines, Synthesis, Isomer, Methanes, Bromides, Chemical reactions, Spectrographic analysis, Ultraviolet radiation, Photochemistry.

Novel phosphonium and phosphorane compounds were prepared by a variety of methods from triphenylphosphine and methylene bromide. Products that have been characterized include: (1) mesomeric phosphonium salts possessing phototropic properties; (2) pentavalent phosphorus compounds; and (3) a mesomeric inner salt. (Author)

AD-278 251 Div. 4,
(TISTM/BRW) OTS price $2.60

Westinghouse Electric Corp., Dayton, Ohio.
GALLIUM ARSENIDE DENDRITE SINGLE CRYSTAL PROGRAM.
Interim technical documentary progress rept. no. 1, 9 Feb-24 May 62.
24 May 62, 25p. incl. illus. 7 refs.
(Contract AF 33(657)8162)
Unclassified report

DESCRIPTORS: *Solar cells, *Gallium compounds, *Arsenides, *Laboratory furnaces, Zinc, Cadmium, Diffusion, Crystals, Preparation, Aluminum compounds, Nitrides, Crucibles, Single crystals.

A furnace capable of pulling 7-in. dendrites was designed. Experience gained from this furnace is being used to design a 24-in. furnace. Experiments on the use of aluminum nitride as a crucible material are in progress. Gallium arsenide solar cells were made by closed tube diffusion of zinc or cadmium. P-type gold or silver contacts were applied to the p-layer and lead contacts to the n-layer. (Author)

AD-278 252 Div. 4
(TISTM/EJH) OTS price $1.10

Washington U., St. Louis, Mo.
ELECTRON-SPIN RESONANCE INVESTIGATIONS OF THE NEGATIVE IONS OF FOUR ORGANOSILICON COMPOUNDS,
by M. G. Townsend. July 62, 8p. incl. illus. 9 refs. (Technical rept. no. 41)
(Contract AF 49(638)464, Proj. 9751)
(AFOSR-2478) Unclassified report

DESCRIPTORS: *Silanes, *Phenyl radicals, *Electrons, *Nuclear magnetic resonance, Complex ions, Free radicals, Nuclear spins, Hyperfine structures, Silicon compounds, Spectrographic analysis, Stability, Spin.

Electron-spin resonance spectra of the negative ions of 4-biphenylytriphenylsilane, di-(4-biphenylyl)diphenylsilane, tetraphenylsilane and tetra-4-biphenylylsilane have been recorded. The unpaired electron is located almost exclusively on the biphenyl substituent in the first radical, but is thought to exchange rapidly between all groups in the third. It has not been possible to determine the electron distribution in the second and fourth. An analogous all-carbon compound, tetraphenylmethane, is spontaneously reduced to the non-magnetic dinegative ion, which is stable only at low temperature and rearranges rapidly at room temperature to produce the biphenylyl mononegative ion. (Author)

AD-278 357 Div. 4, 25
(TISTM/JSM) OTS price $3.60

Nottingham U. (Gt. Brit.).
PHYSICAL AND CHEMICAL PROPERTIES OF ANHYDROUS NITRATES OF THE TRANSITION METALS.
Annual technical rept. no. 11, 1 June 61-30 May 62,
by C. C. Addison. 30 June 62, 36p. incl. illus. tables, 3 refs.
(Contract DA 91-591-EUC-1769)
Unclassified report

DESCRIPTORS: *Transition elements, *Nitrates, *Copper compounds, *Ethers, *Nitro radicals, *Beryllium compounds, *Methanes, Metallic compounds, Chemical bonds, Molecular structure, Crystal structure, Chemical properties, Physical properties, Carbon, Oxygen, Nitrogen compounds, Tetroxides, Zinc compounds, Acetates, Nitrites, Dioxides.

A tentative interpretation is given of the reactions of anhydrous Cu(NO3)2 with ethers. In basic solvents, solvation of the copper atom is believed to result in a weakening of the Cu-NO3 bond; the following dissociation occurs in solution (NO3)Cu-O-NO2 yields (NO3)Cu(+) + NO3(-), and the carbon-oxygen bond in ether is not attacked. With the nitrate alone, or in solution in very weakly basic solvents, the dissociation is believed to be as follows: (NO3)Cu-O-NO2 yields (NO3)CuO(.) + NO2(.). The reactivity towards ether is then the result of NO2(.) free radical release, and the anhydrous nitrate is therefore regarded as a low-temperature source of NO2 radicals. A full account is also given of the products of reaction of basic zinc acetate with dinitrogen tetroxide. The initial product contains combined tetroxide; this can be removed to leave a complex having the formula Zn2(OAc)3NO3, and the actual molecule may be a

material which emits a multiplicity of low energy photons. These photons are then converted to electrical energy by a photovoltaic device. The requirements on the three components (photovoltaic device, luminescent phosphor, and radioisotope) are discussed, and tentative choices of currently available materials for these components are made. (Author)

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-277 950 Div. 8
(TISTE/CAM) OTS price $2.60

Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF AN E-BAND AMPLIFIER.
Technical note no. 5, 1 Jan-31 Mar 62,
by E. W. Kinaman. Apr 62, 22p. incl. illus. table.
(Contract AF 30(602)2422, Proj. 5573)
(RADC TDR 62-293) Unclassified report

DESCRIPTORS: *Microwave amplifiers, *Traveling wave tubes, *Band-pass filters, Extremely high frequency, Electron tube heaters, Heating, Temperature, Electric current, Helixes, Waveguides, Cathodes (Electron tubes), Thermionic emission, Focusing, Magnets, Diodes, Design, Manufacturing methods, Test equipment, Test methods, Miniature electronic equipment, Spheres.

Effort continued towards the development of an E-band amplifier. Details are presented on the current status of relevant tube development, and the progress made on the non-reciprocal electrically-tunable filter employing YIG spheres. Previously reported problems - chiefly, cathode-heater burnouts and cathode-to-anode leakage - were resolved. A newly designed support structure using two concentric thin-metal cones completely eliminated the problem. Operating temperature goal of 1200 C was successfully reached. Required heater power of the original support configuration was approximately 10 watts. The double heat shield requires 4.5 watts. Improvement in cathode emission was obtained by a factor of 30 over the type used in tube no. 1. The improvement was due chiefly to the utilization of a cathode cover. Tube no. 2 was fabricated and tested. The cathode used in tube no. 2 has 3X the activity of that used for tube no. 1. Testing of tube no. 2 discovered an open cathode cup connection; emission was an erratic function of charge buildup. (Author)

AD-277 981 Div. 8, 2
(TISTE/CDM) OTS price $1.10

Centro Radioelettrico Sperimentale ''G. Marconi'' (Italy).
DOPPLER FREQUENCY SHIFT OF H.F. TO S.H.F. RADIO WAVES RETURNED FROM THE SEA,
by I. Ranzi. 15 Sep 61, 4p. incl. illus. (Technical note no. 6)
(Contract AF 61(052)139)
(AFCRL-1126) Unclassified report

DESCRIPTORS: *Radio waves, *Frequency shift, *Sea water, Italy, High frequency, Ultra high frequency, Superhigh frequency, Doppler systems, Tests, Measurement, Scattering, Reflection.

A study was made of HF to SHF radio waves returned from the sea. The radio waves coherently backscattered from the sea waves show a Doppler frequency shift, the value of which is in a good agreement with the one calculated on the ground of the velocity of the sea waves having a length L equal to lambda/2. The experimental results concerning the radio frequencies of 28, 415, and 6,800 mc are discussed. (Author)

AD-277 982 Div. 8
(TISTW/RD) OTS price $1.10

Centro Radioelettrico Sperimentale ''G. Marconi'' (Italy).
AN ERROR CAUSE IN IONOSPHERIC SOUNDING NEAR THE SEA,
by I. Ranzi. 15 Sep 61, 4p. incl. illus. 2 refs.
(Technical note no. 7)
(Contract AF 61(052)139)
(AFCRL-1127) Unclassified report

DESCRIPTORS: *Atmospheric sounding, *Radio transmission, Ionosphere, Errors, Ocean waves, Scattering, Ionospheric propagation, Reflection, Radio waves, Italy.

It is shown that, when an ionospheric sounder of a great sensitivity is placed at a distance from the sea less than 50 km, it is very likely that the strong backscatter from the open sea waves and from the coastal sea waves produces discrete echoes, which may be erroneously attributed to mesospheric reflections. (Author)

AD-277 983 Div. 8
(TISTP/FR) OTS price $1.10

Centro Radioelettrico Sperimentale ''G. Marconi'' (Italy).
BACKSCATTER ECHO-PATTERN AND VERTICAL RADIATION DIAGRAM,
by I. Ranzi. 1 Oct 61, 6p. incl. illus. (Technical note no. 8)
(Contract AF 61(052)139)
(AFCRL-1128) Unclassified report

DESCRIPTORS: *Scattering, Radio waves, Oceans, Earth.

Backscatter echo-patterns showing a strong dependence on the vertical radiation diagram have been obtained. Owing to this result, the virtual reflection height of the backscattered radio waves and the effective backscatter distance may be determined; even the study of the displacement of ionospheric irregularities may be highly improved. (Author)

AD-277 985 Div. 8, 25
(TISTM/EJH) OTS price $2.00

Electro-Optical Systems, Inc., Pasadena, Calif.
RESEARCH ON SPECTRALLY SELECTIVE MATERIALS AND SURFACES.
Final technical rept. for 15 May 59-15 Sep 61 on Energy Conversion Research,
by Horace R. Moore and Richard E. Bradbury.
Apr 62, 62p. incl. illus. table, 13 refs.
(Contract AF 33(616)6549, Proj. 7116)
(ARL 62-336) Unclassified report

DESCRIPTORS: *Optical materials, *Infrared optical materials, *Thermionic emission, *Diodes, *Phosphors, Mirrors, Solar energy, Absorption, Thermal radiation, Metallic compounds, Rare earth compounds, Oxides, Nickel compounds, Surfaces, Thin films, Chelate compounds, Europium, Benzoyl radicals, Acetones, Fluorescence, Excitation, Spectrographic analysis, Semiconductors.

Research on spectrally selective materials and surfaces with particular reference to their application to solar collection and thermionic con-

STL/TR-60-0000-09034)
(Contract AF 04(647)309)
Unclassified report

DESCRIPTORS: *Power supplies, *Primary batteries, *Storage batteries, Electrolytic cells, Silver compounds, Oxides, Nickel, Cadmium, Zinc, Materials, Design, Battery separators, Seals, Satellite vehicles, Guided missiles, Electrochemistry, Electric discharges, Data.

The objective of these studies is to present information related to the operation, performance characteristics, applications, reliability, present as well as expected developments, and physical characteristics of batteries (or battery cells) which appear feasible for use in ballistic missiles and space vehicles. This report details information about silver oxide-zinc and nickel-cadmium galvanic cells. The data given are often typical rather than specific manufacturers' test results; no bias is intended, since data were selected primarily on the basis of ready availability. Addenda to this document will detail more data as they become accessible. (Author)

AD-278 205 Div. 7
(TISTP/FR) OTS price $4.60

Goodyear Aircraft Corp., Akron, Ohio.
SOLAR ORIENTING DEVICE FOR EXPANDABLE FLAT-PANEL ARRAY.
Quarterly progress rept. no. 3, 1 Jan-31 Mar 62, by G. J. McKeel. 26 Apr 62, 46p. incl. illus. tables (Rept. no. GER-10648)
(Contract DA 36-039-sc-88913)
Unclassified report

DESCRIPTORS: *Sheets, *Solar cells, *Mechanical drives, Wind, Load distribution, Sun, Tracking.

The wind loading study was extended to the 36-square-foot solar panel to investigate the effect of various values of wind force and overturning moments in relation to leg length. A table of motor power requirements (peak load) is included for various values of wind velocity. Orientation sensor analysis of the present design is discussed, showing the effect of using a plate perpendicular to the sun shade. The sensitivity test was conducted indoors to determine approximate values of sensor sensitivity to angular deviation. A diagram of the final mount design and drive head assembly is presented and its dimensions and a general description of its construction are discussed. The setup procedure required for operation on sloping terrain is analyzed and a possible modification of the present drive head assembly is discussed. (Author)

AD-278 227 Div. 7, 12
(TISTE/CAM) OTS price $2.60

Monsanto Research Corp., Dayton, Ohio.
HIGH TEMPERATURE THERMOELECTRIC GENERATOR.
Quarterly progress rept. no. 3, 2 Apr-29 June 62, by C. M. Henderson and R. G. Ault. 29 June 62, 23p. incl. illus. tables (Rept. no. MRC 2509)
(Contract AF 33(657)7387, Proj. 3145)
Unclassified report

DESCRIPTORS: *Thermoelectricity, *Generators, Electric power production, Power supplies, Thermocouples, Refractory materials, Carbon, Zirconium, Molybdenum, Tungsten, Sublimation, Diffusion, Design, Manufacturing methods, Electrical properties, Temperature, Test equipment, Test methods, Space probes, Spaceships, Satellite vehicles, Materials.

The development is presented of a 5-watt laboratory thermoelectric generator for operating in space vehicles. Screening of 15 candidate junction materials was completed. Carbon was selected for use with MCC 50 in the fabrication of thermocouple-type modules made by hot-pressing for the 5-watt generator. In sublimation rate loss tests conducted for 1000 hr at 1200 C and 3-9 x 10 to the -6th power mm Hg, MCC 50 lost less than 1% of its weight. Electrical properties of modules suffered no deterioration under actual power producing conditions in test periods to 90 hours at temperatures to 1200 C. Fabrication of the end product generator and construction of needed test equipment are under way. (Author)

AD-278 353 Div. 7, 4
(TISTM/EJH) OTS price $2.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
BASIC STUDIES ON FUEL CELL SYSTEMS.
Quarterly rept. no. 4, 12 Feb-14 May 62, by G. W. Allen, L. B. Anderson and others. May 62, 79p. incl. illus. tables, 22 refs. (Rept. no. 2-99-62-2)
(Contract NOw 60-0738-d)
Unclassified report

DESCRIPTORS: *Fuel cells, *Electrolytic cells, *Power supplies, *Alkaline cells, *Bibliography, Fuels, Hydrazines, Formaldehyde, Ammonia, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Air, Oxygen, Dioxides, Nitrogen compounds, Thermodynamics, Heat transfer, Transport properties, Polarization, Oxygen electrodes, Electrochemistry, Electrodes.

The acid, aqueous hydrazine and formaldehyde anodes, and the acid and alkaline aqueous urea anodes are evaluated. Results are reported for oxygen, air, and nitrogen dioxide oxidants in acid electrolytes, and a summary of the fuel and oxidant studies is given. The feasibility of operating an ammonia-oxygen fuel cell for extended periods (up to 20 weeks) is demonstrated, and the technique of using hydrazine additives is described. An introduction to the fundamental principles of fuel-cell optimization is presented. Included are discussions of system types, polarization, thermodynamics, and heat-transfer and mass-transfer phenomena for fuel-cell application. An optimization treatment of the multiple-cell hydrogen-oxygen fuel cell is presented, and the general problem of fuel-cell scale-up is considered. Annotated bibliographies of selected works on the porous anode and on the oxygen and gas electrodes are included. (Author)

AD-278 364 Div. 7
(TISTP/FR) OTS price $3.60

Armour Research Foundation, Chicago, Ill.
A NUCLEAR-PHOTON ENERGY CONVERSION STUDY.
Quarterly technical rept. no. 1, 1 Apr-1 July 62, by H. V. Watts and C. W. Terrell. 13 July 62, 34p. incl. illus. tables, 19 refs. (Rept. no. ARF 1214-TR1)
(Contract AF 33(657)8527)
Unclassified report

DESCRIPTORS: *Nuclear power plants, *Photoelectric cells, *Phosphors, *Radioactive isotopes, Solar cells, Silicon, Zinc compounds, Cadmium compounds, Sulfides, Beta particles, Strontium.

The design of a radioisotope-powered 10-watt electrical energy power source using a double energy conversion technique is discussed. In this technique, the high energy particles from a radioisotope are absorbed by a luminescent

Quarterly rept. no. 8 (Final), 1 May 60-29 June 62,
by J. W. Hall, II. 29 June 62, 1v. incl. illus. tables.
(Contract NObsr-81225)
Unclassified report

DESCRIPTORS: *Electron tubes, *Thin films, *Statistical analysis, Diodes, Triodes, Anodes, Cathodes (Electron tubes), Coatings, Materials, Processing, Life expectancy, Reliability, Gases, Analysis, Electron microscopes, Electron diffraction analysis, Spectrographic analysis, Mass spectrometers, Radioactivation analysis, Crystal oscillators, Sublimation, X-ray spectroscopy, Test methods, Quality control.

The study of films in electron tubes continued. A supplement to the literature survey is given and the methods of analysis and techniques developed are summarized. The investigation of the XD-26H standard diode-triode by various methods is discussed and the XD-26H analytical and electrical characteristic data are presented. Scattergrams are used to study the effect of tube variables on electrical characteristics and to study the transfer of material during processing and life testing. A summary, conclusions and recommendations for future work are given.
(Author)

AD-278 107 Div. 8, 26
(TISTE/CAM) OTS price $4.60

International Rectifier Corp., El Segundo, Calif.
HIGH VOLTAGE SILICON RECTIFIER STACKS.
Quarterly progress rept. no. 3, 24 Dec 61-24 Mar 62 on Production Engineering Measure,
by Werner Luft. 24 Mar 62, 44p. incl. illus. tables.
(Contract DA 36-039-sc-85977)
Unclassified report

DESCRIPTORS: *Rectifiers, *Diodes, *Manufacturing methods, Industrial production, Design, Packaging, Mechanical properties, Temperature, Voltage, Alternating current, Direct current, Reliability, Test methods.

Effort was directed towards the testing of the second engineering samples; design, material procurement and manufacturing of the third engineering samples; and study of the test requirements. The second set of engineering samples is similar to the first set but is provided with corona shields on both ends. The items are air cooled and are not mechanically representative of the final design. Electrically, the second set differs from the first in that the test specification of the diodes has been tightened. The third set of engineering samples which is now being built is of an oil immersed design. The tanks are also within the required maximum dimensions with the exception of an external expansion vessel. The major effort went into the design of these samples. Electrically the third engineering samples are equivalent to the second.
(Author)

AD-278 114 Div. 8
(TISTP/FR) OTS price $3.60

Microwave Lab., Stanford U., Calif.
EXPERIMENTS WITH A NEW TYPE ADIABATIC CROSSED-FIELD GUN,
by T. A. Midford and G. S. Kino. May 62, 30p. incl. illus. table, 9 refs. (Scientific rept. no. 42; ML rept. no. 901)
(Contract AF 19(604)1930, Proj. 4619)
(AFCRL 62-356) Unclassified report

DESCRIPTORS: *Electron guns, *Electron beams.

Experiments with a long crossed-field gun, designed by a method given by Kino, are described. This gun yielded the predicted value of current, but the other characteristics of the beam were not in accordance with the results of the theory. Experiments were carried out, from which it may be concluded that there are rf instabilities present in the beam, instabilities which grow in the drift region and are generated at the cathode. The rate of growth of these instabilities is of the same order of rate of growth of rf fields given by the theory of McFarlane and Hay.
(Author)

AD-278 120 Div. 8, 14, 12, 30
(TISTM/EJH) OTS price $1.60

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS-REINFORCED PLASTIC MISSILE CASES.
Quarterly technical rept. no. 2, 29 Sep-28 Dec 61,
by Merle L. Rhoten, Jay P. Mitchell and Robert C. McMaster. 20 Jan 62, 15p. incl. illus. table.
(Contract DA 33-019-ORD-3670, Proj. 5B93-32-004)
(WAL TR 142.5/2-1) Unclassified report

DESCRIPTORS: *Image tubes, *Filament wound construction, *Non-destructive testing, Rocket cases, Electron tubes, X-ray diffraction cameras, X rays, Beryllium, Selenium, Tin, Design, Materials, Radiographic analysis, Laminates, Glass textiles, Plastics.

The purpose of this research program is to develop a television X-ray imaging system for the nondestructive inspection of fiber glass-reinforced plastic missile case walls and materials. The difficulties previously encountered in the fabrications of X-ray-sensing vidicon tubes equipped with beryllium windows were alleviated with a new structural design. Tubes with 2000 angstroms of tin as a barrier between the selenium target material and the beryllium faceplate performed successfully to date. The tin also acts as a heat transfer medium to remove heat from the selenium target material. The evaluation of beryllium-window tubes indicates that thick target materials (in excess of 30 microns) produce less signal per quantum of radiation and, consequently, images of less contrast and definition. Vidicon Tube Be 3 (30 microns) produces images of good quality with high resolution.
(Author)

AD-278 127 Div. 8, 25
(TISTP/WH) OTS price $5.60

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
THE SPECTRUM OF ELECTROMAGNETIC WAVES GUIDED BY A PLASMA LAYER,
by T. Tamir and A. A. Oliner. 13 Dec 61, 53p. incl. illus. 30 refs. (Research rept. no. PIBMRI-970-61)
(Contract AF 19(604)4143)
(AFCRL 62-135)
Unclassified report

DESCRIPTORS: *Plasma physics, *Electromagnetic waves, *Propagation, *Wave transmission, Green's functions.

The modal spectrum of a lossless, homogeneous and isotropic planar plasma layer is shown to contain contributions from surface waves and complex modes in addition to the usual continuous spectrum characteristic of open structures. These discrete contributions are only of the E-mode type and occur whenever the plasma dielectric constant (dc) is negative. The surface waves may

version is discussed. The three phases of the studies were: the use of spectrally selective surfaces as solar absorbers; the use of spectrally selective surfaces in thermionic diodes; and the radiative characteristics of phosphor materials. In the first phase, test specimens of metallic oxides on metal substrates were prepared and subjected to thermal equilibrium measurements in a solar test facility. In the second phase, theoretical studies of nickel oxide were made, and experimental measurements of its absorption spectrum and thermionic emission properties were accomplished. The third phase discusses the radiative properties of phosphor materials and reports the measurement of the fluorescence spectrum of a rare earth chelate. (Author)

AD-278 018 Div. 8, 26
(TISTE/CAM) OTS price $1.60

Lansdale Div., Philco Corp., Pa.
PEM FOR ELECTROCHEMICALLY ETCHED TRANSISTORS 2N495 AND 2N496.
Quarterly progress rept. no. 4, 19 Feb-19 May 62, by D. Weisel and D. Schmechel. 19 May 62, 12p. illus. table.
(Contract DA 36-039-sc-85959)
Unclassified report

DESCRIPTORS: *Transistors, *Manufacturing methods, Industrial production, Industrial equipment, Machines, Design, Production.

Progress is reported on both the mechanical and electrical design of the semi-automatic production machine. Mechanical design of several machine subassemblies is complete and the overall machine mechanical design is estimated as 87% complete; electrical design is 76% complete; and manufacture is 60.5% complete. (Author)

AD-278 042 Div. 8, 25
(TISTA/VGW) OTS price $1.25

Westinghouse Electric Corp., Elmira, N. Y.
STUDY ON MATERIAL INTERACTION AND MIGRATION IN CAMERA TUBES.
Final rept., 1 Dec 60-30 Nov 61, on Electronic Tube Techniques,
by Vert Upshaw. Apr 62, 36p. incl. illus. 3 refs.
(Contract AF 33(616)7723, Proj. 4156)
(ASD TDR 62-78) Unclassified report

DESCRIPTORS: *Camera tubes, *Phototubes, *Storage tubes, Iconoscopes, Image intensifiers (Electronics), Thin films, Aluminum compounds, Oxides, Vacuum seals, Indium, Tests, Test methods.

The image orthicon target was selected for a study of the interaction and migration of materials in camera tubes. A demountable structure was built incorporating matrix cathodes for target testing. The demountable seal permitted conventional exhaust and test processing without special equipment. Storage tests on aluminum oxide targets in tubes made without alkali showed resolution of better than 500 lines after an image storage time of 90 minutes. Equipment was constructed for remote handling of tube parts in a vacuum bell jar. The techniques necessary for separate processing of the photosurface, transporting to the tube proper, and then sealing were worked out. Sample photo-diodes and image intensifier tubes have been assembled in the bell jar. The performance of the vacuum system was extremely good, reaching the 10 to the -7th power mm of Hg in 20 minutes and on the 10 to the -8th power scale in two hours. S-11 and S-20 photosurfaces were made in the titanium ion pumped bell jar. Normal photoresponses were obtained after initial processing difficulties. Most of the orthicons produced contained storage targets and tri-alkali photosurfaces. Several tubes displayed 200 lines resolution at 3 x 10 to the -7th power foot candles illumination. (Author)

AD-278 076 Div. 8
(TISTP/FR) OTS price $4.60

Diamond Ordnance Fuze Labs., Washington, D. C.
FEASIBILITY STUDY. MISS-DISTANCE INDICATOR,
by Dominic S. D'Angona and John R. Svaleson. 15 June 62, 50p. incl. illus. table (DOFL rept. no. TR-1013)
Unclassified report

DESCRIPTORS: *Firing error indicators, *Pulse transmitters, Guided missile tracking systems, Telemeter systems, Ultrahigh frequency, Radar beacons.

Results of a feasibility study are reported on a high performance miss-distance indicator (MDI). Indications are that this system design is capable of providing continuous measurements of miss-distance from 4 to 30 ft within a ±2-ft accuracy and from 30 to 100 ft within about ±6-ft accuracy. The transponder unit described in this system, which has a -17 dbm sensitivity, occupies a 9.9-cu in. volume; the target unit occupies less than 250 cu in. Also reported are a detailed description of the system including illustrations of breadboarded constructions, an analysis of the over-all performance, and recommendations that are based on experimental knowledge regarding the critical problem areas. (Author)

AD-278 094 Div. 8, 30
(TISTE/CDM) OTS price $4.60

General Electric Co., Syracuse, N. Y.
STUDY OF ELECTRON FOCUSING BY NON-LINEAR SPIRALS.
Interim engineering rept. no. 1, 26 Feb-30 June 62,
by Kurt Schlesinger. 30 June 62, 45p. incl. illus. tables, 10 refs.
(Contract AF 33(657)7682)
Unclassified report

DESCRIPTORS: *Image tubes, *Camera tubes, *Electron guns, *Test sets, Diodes, Triodes, Focusing, Electrostatics, Acceleration, Collimators, Electron beams, Cathodes (Electron tubes), Deceleration, Thermionic emission, Nonlinear systems, Helixes, Lenses, Tests, Wire screens.

The problem of a plane-to-plane electrostatic image-tube was attacked by theoretical, as well as by experimental, methods. Large spiral-lens cylinders were designed and built to handle focusing and accelerator functions involved. High transmission meshes, both flat and spherical, were prepared for use in test tubes. Ray-tracing studies revealed that an internal convex mesh-anode can produce a convex virtual-image surface from a flat cathode-plane, under certain conditions. Tubes built on that basis showed definite effects from the convex versus the concave shape of the mesh. These effects, however, were too weak to be usable. A triode system, using a strongly convex mesh of conchoidal shape, facing a plane cathode behind a flat first anode mesh, was giving good results. The theory of this aplanatic system, along with some pictorial evidence, is given. (Author)

AD-278 095 Div. 8
(TISTE/CAM) OTS price $19.75

General Electric Co., Owensboro, Ky.
A STUDY OF FILMS IN ELECTRON TUBES.

AD-278 223 Div. 8, 15
(TISTE/CAM) OTS price $12.50

Kane Engineering Labs., Palo Alto, Calif.
ADVANCED KLYSTRON STUDY,
by J. F. Kane and R. N. Wilson. June 62, 173p. incl. illus. refs.
(Contract AF 30(602)2423, Proj. 5573)
(RADC TDR 62-199) Unclassified report

DESCRIPTORS: *Klystrons, *Microwave amplifiers, Electron tubes, Broadband, S band, Cavity resonators, Tuning circuits, Circuits, Impedance matching, Plasma physics, Electron beams, Space charges, Magnetic fields, Design, Mathematical analysis, Partial differential equations, Perturbation theory, Harmonic analysis, Matrix algebra, Transformations (Mathematics), Polynomials, Equations, Motion, Integral transforms.

Matrix methods are used to obtain a tractable theory of a broadband multiresonator klystron in the presence of a single space-charge wave. The theory reveals how various forms of wide pass band functions can be obtained. An exemplary broadband tube design is discussed. The matrix theory is also extended to include the effects of all space-charge harmonics in a form which in principle permits one to write matrix descriptions of klystrons by inspection. The large-signal multiresonator klystron problem is formulated in terms of a displacement vector field and the vector normal modes of a structure. Specific use is made of the infinite beam model to obtain an exact expression for large signal operation of two-resonator klystrons. Results generally have upheld the idea that the klystron can be built as a broadband device with bandwidths exceeding 20% and can also be designed to exhibit sophisticated phase versus frequency characteristics. (Author)

AD-278 233 Div. 8
(TISTP/FR) OTS price $9.10

Microwave Research Inst., Polytechnic Inst. of Brooklyn, N. Y.
STUDY AND INVESTIGATION OF DESIGN PARAMETERS OF HIGH POWER GASEOUS DISCHARGE SWITCHES.
Final progress rept.,
by C. Ward and N. Brown. 1961, 106p. incl. illus.
(Contract AF 30(602)2030, Proj. 4506)
(RADC TDR 62-352)
Unclassified report

DESCRIPTORS: *Radar duplexers, *Transmit-receive tubes, *Anti-transmit-receive tubes, *Gas discharges, L band, Argon, Plasma physics.

An investigation and study program has been completed at L band to determine the limitations of a gas discharge as a high power duplexer switch. The encapsulated window was fully investigated as a basic window element in fabricating high power duplexers. (Author)

AD-278 264 Div. 8
(TISTP/FR) OTS price $1.10

Rome Air Development Center, Griffiss Air Force Base, N. Y.
BINARY TO TERNARY CONVERSION BY LINEAR FILTERING,
by Jack K. Wolf and Walter R. Richard. May 62, 8p. incl. illus. 3 refs. (RADC TDR 62-230)
Unclassified report

DESCRIPTORS: *Pulse analyzers, *Pulse generators, Coding, Sequential analysis.

A simple linear filter consisting of a delay element and an adder is described for converting a random stream of binary pulses into a stream of ternary pulses. An interesting aspect of the stream of ternary pulses is that its power spectral density is exactly the same form as the power spectral density of the binary pulses (i.e., sin squared x/x squared) except that the frequency scale is reduced by a factor of two. Another simple linear filter is described for reconverting the stream of ternary pulses into the stream of binary pulses. Results of an experimental implementation of such a system are presented. Also, a generalization of this scheme for binary to N-ary to binary conversion is discussed. (Author)

AD-278 296 Div. 8
(TISTP/FR) OTS price $6.60

Raytheon Co., Bedford, Mass.
STUDY OF HF FREQUENCIES FOR EXO- AND ENDO-IONOSPHERIC COMMUNICATIONS.
Interim rept. no. 1, 28 Mar-28 June 62,
by Mario D. Grossi, Richard C. Gunther and others. 12 July 62, 66p. incl. illus. tables, 23 refs. (Rept. no. BR-1855)
(Contract AF 33(657)7791)
Unclassified report

DESCRIPTORS: *Radio communication systems, *Ionospheric propagation, *Wave transmission, Radio waves, High frequency, Ducts, Satellite vehicles.

Preliminary results on an analysis of HF ionospheric propagation, which has the major aim of searching for wave-guidance modes in the upper ionosphere, across the F2 layer, and below it are presented. To perform this search, a Hamiltonian ray tracing method has been developed to include the effect of the earth's magnetic field, of the collisional frequency, of various models of ionospheric irregularities and discontinuities, upon the HF propagation. The search for wave-guidance modes has been oriented toward a possible use of these modes in satellite-to-satellite, satellite-to-ground communications beyond line of sight. Possibility to apply some of these modes to global communications has been also analyzed. A computer program which performs the Hamiltonian ray-tracing allows the calculation of the main parameters of the rays considered: total path losses, bandwidth available, e.m. wave polarization, multipath structure are among the computed ray's characteristics. (Author)

AD-278 350 Div. 8, 26
(TISTM/EJH) OTS price $1.60

Electronic Defense Labs., Mountain View, Calif.
RELIABILITY OF WELDED ELECTRONIC CONNECTIONS,
by Mark Hurowitz. 23 May 62, 17p. incl. illus.
(Technical memo. no. EDL-M473)
(Contract DA 36-039-sc-87499)
Unclassified report

DESCRIPTORS: *Electronic equipment, *Welds, *Welded joints, Joints, Nickel, Resistance, Humidity, Corrosion, Salts, Reliability, Welding.

In four life tests, run to determine the reliability of welded electronic connections, measurements for joint resistivity and joint strength were made on each of several sets of samples. Respectively, the tests involved nickel ribbon welded to #24 buss wire, nickel strap to Kovar transistor welds, and nickel ribbon to 1/4 watt resistor leads (RC07GF). Some of these tests were in the open while others were run under 95 relative humidity for both cleaned and

be of the forward or the backward type and they carry power in opposite directions in the plasma and air regions. The complex modes are shown to appear always in degenerate pairs and, as a consequence, they carry no real power but may account for large reactive fields in the neighborhood of sources. For E-modes with positive values of dc and for all H-modes the spectrum is purely continuous; however, non-spectral leaky waves are then present which are significant in radiation considerations. (Author)

AD-278 138 Div. 8
(TISTP/FR) OTS price $15.50

Stanford Research Inst., Menlo Park, Calif.
AN INVESTIGATION OF THE DIRECT BACKSCATTER OF HIGH-FREQUENCY RADIO WAVES FROM LAND, SEA WATER, AND ICE SURFACES.
Final rept. no. 2,
by George Hagn. May 62, 238p. incl. illus. tables, 29 refs.
(Contract Nonr-291700)
Unclassified report

DESCRIPTORS: *Radio waves, *Scattering, Very high frequency, Oceans, Ice, Earth, Terrain.

An airborne high-frequency radar operating at 32.8 Mc was used to investigate the backscatter of radio energy from the earth's surface. The backscatter from various topographical features such as the ocean, polar sea ice, and selected land surfaces was examined for significant characteristics. This report describes the equipment used and presents the derivation of a backscatter reflection coefficient; however, the primary emphasis is upon the data and interpretation. (Author)

AD-278 139 Div. 8
(TISTP/FR) OTS price $10.10

Sylvania Electric Products, Inc., Waltham, Mass.
THEORETICAL INVESTIGATION OF DUAL RATE TRANSMISSIONS OVER GAUSSIAN MULTIPLICATIVE CIRCUITS.
Final rept.
12 Apr 62, 127p. incl. illus. tables, 12 refs.
(Rept. no. F-1004-1)
(Contract AF 19(604)7488, Proj. 4610)
(AFCRL-62-198) Unclassified report

DESCRIPTORS: *Radio communication systems, *Information theory, Attenuation, Signal-to-noise ratio, Noise (Radio), Probability.

The simplest form of a variable data rate communication system, an on-off system, which in the ideal case has been shown to be almost as good as the continuously variable rate system is detailed. The effects of Rayleigh fading and additive Gaussian noise in both the forward and feedback channels are studied. The imperfect feedback channel introduces the possibility that the receiver may not know when data is being transmitted, thus causing a so-called message displacement in which a block of data is missed or a block of noise is inserted in the received message. An on-off, binary communication system is developed which can be designed to have a very low probability of message displacement together with data rates which are close to optimum. (Author)

AD-278 146 Div. 8
(TISTP/WH) OTS price $5.60

University of Southern Calif. Engineering Center, Los Angeles.
RADIATION FROM A PLASMA-CLAD AXIALLY-SLOTTED CYLINDER,
by W. V. T. Rusch. May 62, 46p. incl. illus. 3 refs. (Rept. no. USCEC 82-201)
(Contract AF 19(604)6195, Proj. 4642)
(AFCRL-714) Unclassified report

DESCRIPTORS: *Slot antennas, *Antenna radiation patterns, *Plasma physics.

Expressions were developed for the complete radiation pattern from a finite axial slot on an infinite circular cylinder covered with a homogeneous, uniform plasma sheath. The resulting field expressions are functions of both the longitude angle and the polar angle. Numerical results were obtained for a thin lossless plasma to determine the variation of the field pattern with plasma frequency, plasma thickness, slot width, and cylinder radius. These results are presented graphically to illustrate various properties of the radiating system. (Author)

AD-278 184 Div. 8, 15
(TISTP/WH) OTS price $7.60

Case Inst. of Tech., Cleveland, Ohio.
EQUIVALENCE OF NON-RECIPROCAL ACTIVE AND PASSIVE NETWORKS,
by Allan D. Waren. 20 Apr 62, 68p. incl. illus. 24 refs. (Technical rept. no. 4)
(Contract Nonr-114110, Proj. NR-375-370)
Unclassified report

DESCRIPTORS: *Electrical networks, *Circuits, *Transistors, Matrix algebra, Topology.

The requisite mathematical background of the congruence transformation as applied to the theory of equivalent networks is developed. The equivalence conditions previously developed for reciprocal networks are extended to the general case of active or passive, reciprocal or non-reciprocal networks. A design procedure, utilizing these concepts, for converting from one- or two-stage vacuum tube amplifiers to equivalent transistor amplifiers is outlined, and the extension to more complex networks indicated. The formulation of the theory of equivalent networks is evaluated on the basis of the above results, and an extension of the theory is proposed which seems more readily applicable to computer study. Further research in this area is outlined. (Author)

AD-278 212 Div. 8, 7
(TISTP/FR) OTS price $1.60

Illinois U., Urbana.
TRANSISTORIZED GENERATOR VOLTAGE CONTROL FOR A PRECISION, LARGE CURRENT MAGNET,
by J. C. Hafele and J. S. Allen. June 62, 11p. illus. 9 refs. (Technical rept. no. 42)
(Contract Nonr-183405)
Unclassified report

DESCRIPTORS: *Voltage regulators, *Cyclotron magnets, Transistors, Generators, Direct current, Current regulators.

A fully transistorized generator voltage control for a precision cyclotron magnet current regulator is described. Need for an external power supply for the generator field current is eliminated by using self excitation. The control is stabilized by an auxiliary AC feedback loop. Variations in the generator output voltage are less than 0.1 volt. With a slight modification the circuit can be used as a simple, versatile generator voltage regulator with about 0.1% regulation. (Author)

AD-278 073 Div. 9, 25
(TISTP/TL) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
THE MAGNETOGASDYNAMIC SOURCE,
by F. D. Hains. May 62, 22p. incl. illus. 1 ref. (Flight Sciences Lab. rept. no. 58; Document no. D1-82-0166)
Unclassified report

Also available from the author.

DESCRIPTORS: *Magnetohydrodynamics, *Electric fields, *Magnetic fields, *Gas flow, *Supersonic flow, *Subsonic flow, Mach number, Enthalpy, Pressure, Reynolds number, Temperature, Density, Partial differential equations, Velocity.

A study is made of magnetogasdynamic source flow with crossed electric and magnetic fields. The uniform electric field is normal to the plane of the source, and the magnetic field lines are concentric circles about the center of the source. The analysis is restricted to small magnetic Reynolds numbers and assumes the electrical conductivity is constant. Three different cases are considered. If the electric field vanishes, the flow is isoenergetic, and all solutions choke except one which starts from the maximum velocity at a point near the center of the source, and decelerates through the sonic velocity to stagnation conditions at infinity. If the magnetic field vanishes, all solutions choke. For the general case when both the magnetic and electric fields are acting, a solution is obtained in which the flow accelerates at constant Mach number and pressure. At the center of the source the velocity and temperature must be zero. As the flow accelerates, the velocity increases linearly with distance, while the temperature increases with the square of the distance. (Author)

AD-278 075 Div. 9, 31
(TISTE/CAM) OTS price $2.60

David Taylor Model Basin, Washington, D. C.
TESTS OF MACHINED DEEP SPHERICAL SHELLS UNDER EXTERNAL HYDROSTATIC PRESSURE,
by Martin A. Krenzke. May 62, 28p. incl. illus. tables, 11 refs. (Rept. no. 1601)
Unclassified report

DESCRIPTORS: *Structural shells, *Hemispherical shells, Elastic shells, Aluminum alloys, Machining, Hydrostatic pressure, Elasticity, Model tests, Test methods, Underwater, Stresses, Failure (Mechanics), Buckling.

Twenty-six structural models, consisting of hemispherical shells bound by ring-stiffened cylinders designed to provide ideal edge conditions, were machined from two aluminum alloys and collapsed under hydrostatic pressure. The models were designed to investigate both elastic and inelastic failures. The collapse pressure of those models which failed elastically could not be predicted by either the linear theory of Zoelly or any of the available large-deflection theories. When an empirical formula based on the observed elastic collapse pressures was used, the collapse pressure of those models which failed at stress levels above the proportional limit of the material could be predicted with reasonable accuracy. The agreement between the experimental values and those obtained from this empirical formula is within + 2 and - 12 percent. (Author)

AD-278 097 Div. 9
(TISTP/FR) OTS price $5.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
HYDROELASTIC EFFECTS ON THE LIFT OF HIGH SPEED HYDROFOILS.
Final rept.,
by J. Dulmovits. 1 May 62, 55p. incl. illus. tables, 6 refs. (Rept. no. STR-MAR-100)
(Contract NObs-84570)
Unclassified report

DESCRIPTORS: *Hydrofoils, *Elasticity, Cavitation, Lift.

A method is presented by which the effects of elasticity (twist and change in chordwise shape) on the lift of a flexible supercavitating hydrofoil with known elastic properties may be calculated. This method is then used to calculate the lift on four hydrofoils and a comparison is made with the lift measured in the Grumman Whirl Tank. (Author)

AD-278 128 Div. 9
(TISTA/WAW) OTS price $4.60

Polytechnic Inst. of Brooklyn, N. Y.
COMPRESSIBLE VISCOUS FLOW IN A TWO-DIMENSIONAL ADIABATIC CHANNEL,
by Jer-shene Shang and Martin H. Bloom. May 62, 36p. incl. illus. tables, 13 refs. (PIBAL rept. no. 749)
(Contract AF 49(638)445, Proj. 9781)
Unclassified report

DESCRIPTORS: *Ducts, *Compressible flow, Aerodynamics, Viscosity, Subsonic flow, Supersonic flow, Integral equations, Differential equations, Fluid flow, Mathematical analysis.

The analysis of compressible viscous flow in a two-dimensional adiabatic channel is made by means of a boundary layer approximation. In particular, two-dimensional laminar flow within parallel adiabatic walls is treated. Some solutions were obtained which are in agreement with the results of more conventional one-dimensional flow analysis as far as pressure gradient and choking length are concerned. However, in the well-behaved cases profile changes involving popping and reverse flow are observed. This can be explained on the basis of non-uniformity in density and momentum over the cross section. Another set of cases which exhibit more unusual behavior are obtained. They are largely associated with positive pressure gradients in subsonic flow and negative pressure gradients in supersonic flow. It is observed that, due to nonuniform velocity, the flow may be partially supersonic and partially subsonic over a section. Mathematically, the initial pressure gradient can be prescribed in this analysis. Therefore, the unusual pressure gradient cited can be obtained in principle. The physical significance of the unusual solutions is discussed. (Author)

AD-278 129 Div. 9
(TISTA/WAW) OTS price $4.60

Polytechnic Inst. of Brooklyn, N. Y.
THREE-DIMENSIONAL EFFECTS IN VISCOUS WAKES,
by Martin H. Steiger and Martin H. Bloom. June 62, 32p. incl. illus. table, 9 refs. (PIBAL rept. no. 711)
(Contract AF 49(638)445, Proj. 9781)
Unclassified report

DESCRIPTORS: *Wake, *Fluid flow, Compressible flow, Jet mixing flow, Viscosity, Turbulent flow, Laminar boundary layer, Turbulent boundary layer, Integral equations, Mathematical analysis.

salted samples. A dc current was passed through the samples to accelerate joint failure. After a total of 6.9 x 10 to the 6th power weld hours of life test, no joint failures were recorded. Moreover, no gross joint deterioration occurred. (Author)

AD-278 370 Div. 8
(TISTE/CDM) OTS price $1.60

Army Signal Research and Development Lab., Fort Monmouth, N. J.
FOURPOLE PARAMETRIC CHARACTERIZATION OF INTEGRATED CIRCUITS,
by L. F. Wagner, Jr. and James D. Meindl.
15 Jan 62, 21p. incl. illus. tables, 4 refs.
(ASRDL technical rept. no. 2255)
Unclassified report

DESCRIPTORS: *Microminiaturization (Electronics), *Electronic circuits, *Transistor amplifiers, *Packaged circuits, Mathematical analysis, Matrix algebra, Theory.

A transistor amplifier operating under normal dc bias conditions as an entity rather than as a transistor in combination with related passive circuit elements is discussed. The fourpole parameters of these complete circuits are derived and tabulated. These parameters may be used directly in known formulae to calculate the terminal performance of their respective integrated or conventional circuits. (Author)

AD-278 395 Div. 8, 25
(TISTE/CAM) OTS price $8.10

Electronics Research Lab., U. of Calif., Berkeley.
CONSOLIDATED QUARTERLY PROGRESS REPORT NO. 5.
15 May 62, 71p. incl. illus. table, refs.
Unclassified report

DESCRIPTORS: *Circuits, *Amplifiers, *Digital computers, *Programming, *Electron beams, *Plasma physics, *Solid state physics, *Electronics, Propagation, Focusing, Magnetic fields, Waveguides, Antennas, Materials, Noise (Radio), Mathematical analysis, Theory, Electronic equipment.

Contents:
Circuits
Computer theory and programming
Electron streams and interactions
Plasmas
Radiation and propagation
Solid-state electronics
Systems
Miscellaneous

9. FLUID MECHANICS

AD-277 974 Div. 9, 25
(TISTP/WH) OTS price $1.60

Brown U., Providence, R. I.
THERMODYNAMICS OF A LOOSELY-PACKED GRANULAR AGGREGATE,
by Boa-Teh Chu. June 62, 9p. incl. illus.
2 refs. (Technical rept. no. 3)
(Contract DA 19-020-ORD-4761, Proj. 5S04-01-027)
Unclassified report

DESCRIPTORS: *Gas flow, *Shock waves, *Propagation, *Combustion, *Thermodynamics, Pyrotechnics, Mixtures.

The thermodynamic properties of a loosely-packed granular aggregate are calculated. An application of these formulas to the study of a shock wave in a granular mixture is indicated. (Author)

AD-277 975 Div. 9, 25
(TISTP/WH) OTS price $2.60

Brown U., Providence, R. I.
A MACROSCOPIC THEORY OF TWO-PHASE FLOW WITH MASS, MOMENTUM AND ENERGY EXCHANGE,
by Boa-Teh Chu and J. Y. Parlange. June 62,
20p. 8 refs. (Technical rept. no. 4)
(Contract DA 19-020-ORD-4761, Proj. 5S04-01-027)
Unclassified report

DESCRIPTORS: *Gas flow, *Shock waves, *Propagation, *Combustion, *Thermodynamics, Pyrotechnics, Mixtures.

A macroscopic theory of two-phase flow with mass, momentum and energy exchange is discussed. The theory is applied to the study of systems which depart only slightly from local thermodynamic equilibrium. An example of wave propagation in a two-phase medium with viscous and thermal relaxation is calculated. It confirms some of the predictions of previous research where a thermodynamic analysis was carried out. (Author)

AD-278 017 Div. 9
(TISTA/WAW) OTS price $2.60

Polytechnic Inst. of Brooklyn, N. Y.
BOUNDARY CONDITIONS AT THE OUTER EDGE OF THE BOUNDARY LAYER ON BLUNTED CONICAL BODIES.
Rept. on Aerothermodynamic Investigations,
by Victor Zakkay and Egon Krause. July 62,
21p. incl. illus. table, 10 refs.
(Contract AF 33(616)7661, Proj. 7064)
(ARL 62-386) Unclassified report

DESCRIPTORS: *Blunt bodies, *Conical bodies, Shock waves, Supersonics, Aerodynamics, Mathematical analysis, Integral equations, Boundary layer.

A method for predicting the variation of Mach number that prevails at the outer edge of the boundary layer of a blunt conical body is presented. The method consists of solving the mass flow equation as given by the similar solutions of Lees. The mass flow equation is integrated and an expression for the distance where the local Mach number reaches the conical value is given. In the analysis, the static pressure is assumed to be constant over the entire portion of the cone, and the properties at the outer edge of the boundary layer are calculated from the final solution. Finally, the analysis is compared with some of the experimental results available in the literature. It is indicated that good agreement was obtained for this comparison. (Author)

AD-278 048 Div. 9
(TISTA/WAW) OTS price $4.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
A SURVEY OF THE SHOCK STRUCTURE PROBLEM,
by L. Talbot. 1 May 62, 31p. illus. 49 refs.
(Rept. no. R62SD46) Unclassified report

DESCRIPTORS: *Shock waves, Detonation waves, Aerodynamics, Boundary layer, Blunt bodies, Hypersonic flow, Superaerodynamics, Mathematical analysis, Theory, Measurement, Analysis.

A survey is made of recent theoretical and experimental investigations on the structure of shock waves. Included are discussions of shock structure in monatomic gases, relaxation and diffusion phenomena in shock waves, some brief comments on detonation waves, and some remarks on the interaction between the shock wave and the shock layer in low-density hypersonic flow over a blunt body. (Author)

AD-278 235 Div. 9
(TISTA/WAW) OTS price $8.10

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SUBSONIC FLUTTER OF PANELS ON CONTINUOUS ELASTIC FOUNDATIONS - EXPERIMENT AND THEORY,
by John Dugundji, Earl Dowell, and Brian Perkin. Apr 62, 79p. incl. illus. tables, 8 refs. (Rept. no. ASRL TR 74-4)
(Contract AF 49(638)219)
Unclassified report

DESCRIPTORS: *Airplane panels, *Flutter, Aerodynamics, Subsonic flow, Stability, Mathematical analysis, Differential equations, Model tests, Wind tunnel models, Elasticity.

The subsonic aeroelastic stability of a two-dimensional panel resting on a continuous elastic foundation was investigated experimentally and theoretically. Experimentally, tests were conducted on a 104 x 24 x 0.018 in. rectangular aluminum panel in a low-speed wind tunnel. Definite flutter of a travelling wave type was observed. Films and oscillograph records were taken. Theoretically, a finite panel, two mode, standing-wave analysis was shown to give essentially the same behavior as the infinite panel, travelling-wave analysis of Miles (Jnl. Aeron. Sci. Vol. 23, No. 8, 771-791, 1956) for this panel on an elastic foundation. Although a mild, divergence-type instability exists for these panels, the dominant instability was shown to be of a travelling wave, flutter type. The role of additional internal damping was investigated and found to have an interesting destabilizing effect between the divergence and flutter speeds. Comparison of experiment and theory showed good agreement in the prediction of the flutter speed and wavelength, but rather poor agreement in the wave speed and frequency at flutter. (Author)

AD-278 239 Div. 9
(TISTP/FR) OTS price $7.60

Institute of Mathematical Sciences, New York U., N. Y.
MAGNETOHYDRODYNAMIC FLOW PAST A THIN AIRFOIL,
by E. Cumberbatch, L. Sarason, and H. Weitzner. 15 Mar 62, 71p. incl. illus. (Rept. no. MF-28)
(Contract AF 49(638)1006)
(AFOSR-2278) Unclassified report

DESCRIPTORS: *Magnetohydrodynamics, *Fluid flow, Airfoils.

The steady flow of a perfectly conducting magnetohydrodynamic fluid past a thin non-conducting airfoil is studied in the model in which the fluid variables obey the Lundquist equations linearized about a constant unperturbed flow. Hyperliptic flows, in which hyperbolic and elliptic fields are superimposed, are considered. Results of Grad, McCune and Resler, and Sears and Resler are extended to the case of an arbitrarily inclined unperturbed field. The general solution contains four line singularities along the characteristics through the ends of the body, and has two arbitrary constants. By a generalized Kutta-Joukowski condition these constants are fixed so that two of the line singularities disappear. Specifically, it is required that the solution be locally square integrable. Behavior of the exponents of the singularities is investigated by numerical computation and, in limiting cases, analytically. The singular parts of some flows are investigated numerically. (Author)

AD-278 272 Div. 9
(TISTP/FR) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
SYSTEM CAVITATION PARAMETERS,
by L. B. Dumont. 15 May 62, 25p. incl. illus. (Rept. no. 6110-6934-RU-000)
(Contract AF 04(694)1)
(BSD TDR 62-87) Unclassified report

DESCRIPTORS: *Cavitation, *Fuel pumps, Mathematical analysis.

The use of Suction Specific Speed as a pump cavitation parameter will, in some cases, lead to inaccuracy and the incorrect interpretation of performance data. A new cavitation parameter, which is related to the Suction Specific Speed but avoids these disadvantages, is derived. This parameter, the Suction Index, can be employed as both a pump design and performance analysis parameter. In the area of pump design, the use of the Suction Index in the optimization of a pump-fed liquid-engine missile system is illustrated. This parameter, when minimized in a pump design, minimizes the combined weight of the propellant tanks and pumps. (Author)

AD-278 287 Div. 9
(TISTP/FR) OTS price $3.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
ELECTRON DISTRIBUTION FUNCTION AND ELECTRICAL CONDUCTIVITY OF A SLIGHTLY IONIZED GAS,
by Douglas H. Sampson and Jacob Enoch. June 62, 34p. incl. 10 refs. (Rept. no. R62SD64)
Unclassified report

DESCRIPTORS: *Gas ionization, Electric fields, Electrons, Distribution, Statistical functions.

An expansion of a formally rigorous integral solution of the Boltzmann equation in powers of the electric field and m/M is used to demonstrate clearly the correct expression for the conductivity of a spatially homogeneous slightly ionized gas. The conditions under which the isotropic part of the electron distribution function reduces to the Margenau distribution are determined. A discussion of the physical reasons for the possibility of negative conductivity is given. (Author)

AD-278 366 Div. 9
(TISTP/FR) OTS price $7.60

Ohio State U. Research Foundation, Columbus.
THE EXPERIMENTAL APPLICATION OF SONIC-PNEUMATIC PROBE SYSTEMS TO TEMPERATURE MEASUREMENT IN A HYPERSONIC AIRSTREAM.
Final technical rept., on Aerospace Simulation Techniques Research,
by Don E. Welshimer. June 62, 70p. incl. illus. 20 refs.
(Contract AF 33(616)5593, Proj. 7065)
(ARL 62-364) Unclassified report

DESCRIPTORS: *Temperature, *Hypersonic flow, Air, Measurement, Pneumatic systems, Sound.

The feasibility of measuring the total temperature of a low density hypersonic airstream by using sonic-pneumatic probe systems was investigated. Three successive probe systems were designed and tested at Reynolds numbers between 1,000 and 100,000 (based upon probe diameter and approaching free-stream conditions). Results showed that the accuracy of the temperatures indicated by a sonic-pneumatic probe system depended highly upon design and that a properly designed sonic-pneumatic probe system yielded, at

Three-dimensionality in wake-like or jet-like free-mixing is investigated. The first section of the report deals with the general mathematical model, in which the boundary layer approximations are used and with methods of solution. Laminar and turbulent flow, compressibility, unsteadiness and streamwise pressure gradients are admitted initially. The flux forms of the equations are given. Algebraic integrals of the energy equations and the diffusion (frozen-flow) equations are obtained. A simplification of the convective terms, roughly corresponding to the Oseen approximation, is used in the asymptotic downstream region. This results in linearization in the case of constant-fluid-properties, and permits the derivation of convenient solutions. Corresponding first-approximation solutions are obtained for the compressible case. Finally, second-approximation improvements are derived. The second section contains explicit solutions for specific configurations, in particular for flows whose initial isovels are of elliptic shape. These flows may be wake-like or jet-like. Compressibility is admitted; however, the flows must have uniform pressure and be steady. The final section deals with interpretation and evaluation of the results. (Author)

AD-278 149 Div. 9, 25
(TISTP/WH) OTS price $2.75

Vidya, Inc., Palo Alto, Calif.
HIGH-TEMPERATURE TRANSPORT COEFFICIENTS OF SELECTED GASES.
Rept. for 1 May-1 Sep 61 on Aerothermodynamic Investigations in High Speed Flow,
by Boris Ragent and Charles E. Noble, Jr.
Apr 62, 119p. incl. illus. tables, 52 refs.
(Contract AF 33(616)8338, Proj. 7064)
(ARL 62-328) Unclassified report

DESCRIPTORS: *Gases, *Thermodynamics, *Transport properties, *High temperature research, Rare gases, Air.

The present status of knowledge of high-temperature transport coefficients of air, air constituents, and the rare gases is reviewed. The theoretical framework used for computing transport coefficients is described and its limitations are indicated. The sources, both experimental and computed, of the interparticle potentials used in the calculations are presented. Data available in the literature are shown in graphical form suitable for intercomparison, and criticisms of these data are made. Conclusions about the status of knowledge of transport coefficients are given, and recommendations are made for preferred values of transport coefficients in the temperature range higher than 4000 R. (Author)

AD-278 178 Div. 9
(TISTA/WAW) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
CONICAL FLOW PARAMETERS FOR AIR AND NITROGEN IN VIBRATIONAL EQUILIBRIUM,
by Paul D. Kelly. Mar 62, 54p. incl. illus. tables, 5 refs. (BRL rept. no. 1164)
(Proj. 503-03-001)
Unclassified report

DESCRIPTORS: *Conical bodies, *Hypersonics, Bodies of revolution, Gas flow, Nitrogen, Air, Shock waves, Pressure, Temperature, Density, Differential equations, Aerodynamics, Mathematical analysis.

The Taylor-Maccoll equation for supersonic flow about cones has been integrated numerically for air and nitrogen in instantaneous vibrational equilibrium (chemical reactions are assumed to be frozen). Free stream Mach numbers from 8 to 20 were used for 300 K free stream temperature. The values of the flow quantities (i.e., velocity components, polar angle, temperature, pressure and density) are given through the shock layer for different values of free stream Mach number and flow deflection angle at the shock. It was found that by non-dimensionalizing some of the flow quantities (temperature, pressure and density) with respect to the changes in their values across the shock layer and by plotting them as functions of the non-dimensional shock layer thickness, that the points for different values of free stream Mach number and cone angle lie along the same curves. This gives an approximate method of obtaining other solutions. The results presented are shown to lie between those of Kopal (translation and rotational degrees of freedom only) and Romig (dissociation and ionization included) as expected. (Author)

AD-278 214 Div. 9
(TISTP/FR) OTS price $3.60

Israel Inst. of Tech., Haifa.
RESEARCH ON CROSS STRESSES IN THE FLOW OF DIFFERENT GASES,
by Markus Reiner. 1 Apr 62, 35p. incl. illus. tables, 13 refs.
(Contract AF 61(052)223)
Unclassified report

DESCRIPTORS: *Gas flow, *Stresses, *Vacuum pumps, Air, Nitrogen, Argon, Carbon dioxide, Helium, Neon.

Cross-stresses in the flow of different gases: The cross stresses effect as discovered by Reiner in the laminar flow of air is shown to be present in mono-, di- and tri-atomic gases in about the same order of magnitude. Cross-stresses in the laminar flow of gases in accordance with Maxwell's dynamical theory: It is shown that a theorem as established by Maxwell may lead to a cross-stress implying a centripetal effect in torsional flow. (Author)

AD-278 220 Div. 9
(TISTP/FR) OTS price $7.60

Coordinated Science Lab., U. of Illinois, Urbana.
ON THE STRUCTURE OF SHOCK WAVES IN MONATOMIC GASES,
by S. M. Ramachanda. May 62, 71p. incl. illus. 33 refs. (Rept. no. R-140)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Shock waves, *Gases, Atoms, Differential equations, Integral equations.

A study was made of the structure of plane, steady shock waves in a neutral monatomic gas using the Boltzmann equation of the kinetic theory of gases and considering the molecules to be rigid elastic spheres. Two collision models are considered: In one model the postulate of a Maxwellian distribution of the lateral components of the molecular velocity is used and the kinetic model of Krook applied to the resulting collision integral thus reducing the Boltzmann equation to a linear form in the longitudinal velocity distribution function for which the corresponding transport equations are also derived; the second model uses the Boltzmann equation and the associated equations of transfer. As in the original Krook kinetic model, conservation of particle number, momentum and energy are also ensured at each collision for the present modified kinetic model. (Author)

other did not. Water is present, largely as a result of residual moisture which has evaporated from the propellant, although part of it is undoubtedly a decomposition product. Small amounts of acetaldehyde, ethanol, benzene, and other organic molecules were probably also present. Analyses of the propellants after 3.5 years showed a reduction in stabilizer content to negligible amounts. The time to salmon pink in the 120 C Heat Test was reduced from that usually obtained with usable samples of these propellants at manufacture. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

No Entries

most, ±3.3% scatter at a total temperature of 2700 R. Furthermore, the magnitude of this maximum error appeared to remain nearly constant throughout the 800 R to 2800 R temperature range of testing. Thus by the addition of water cooling, it is expected that a sonic-pneumatic probe system could be used in a 5000 R hypersonic airstream with a maximum error of about ±2%. (Author)

AD-278 376 Div. 9, 25, 15
(TISTP/WH) OTS price $10.50

Brown U., Div. of Applied Mathematics, Providence, R. I.
ON THE LINEAR THEORY OF VISCOELASTICITY,
by M. E. Gurtin and Eli Sternberg. June 62, 127p. 42 refs. (Technical rept. no. 6)
(Contracts Nonr-56230 and Nonr-56225, Proj. NR 064-450)

Unclassified report

DESCRIPTORS: *Viscosity, *Elasticity, *Linear systems, Theory, Mathematical analysis, Integral equations.

Contents:
Mathematical preliminaries; Stieltjes convolutions
Linear hereditary stress-strain laws
Stress-strain relations in integral-equation form
Stress-strain relations in differential-equation form
Alternative formulations of boundary-value problems
Viscoelastic states
Properties of viscoelastic states
Integral theorems
Uniqueness
Stress functions

10. FUELS AND COMBUSTION

AD-277 953 Div. 10
(TISTM/JSM) OTS price $.75

Nonmetallic Materials Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
FUTURE AIR FORCE REQUIREMENTS FOR HYDROCARBON FUELS.
Rept. for Feb 58-Sep 61, on Aviation Fuels,
by Jack R. Fultz. May 62, 17p. incl. tables, 9 refs.
(Proj. 3048)
(ASD TR 61-728) Unclassified report

DESCRIPTORS: *Aviation fuels, *Jet engine fuels, *Hydrocarbons, *Air Force, Fuels, Military requirements, High temperature research, Polycyclic compounds, Monocyclic compounds, Alkyl radicals, Hypervelocity vehicles, Supersonic planes, Vapors, Naphthalenes, Methyl radicals, Ethyl radicals, Hexanes, Phenanthrenes.

The two hydrocarbon structures exhibiting the most promise as candidate high temperature fuels are the alkyl-substituted monocyclics and the alkyl-substituted condensed bicyclics. For specialized fuels, the isoparaffin structure best suits the requirements for a weight-limited fuel application whereas for an extreme high density fuel the condensed tricyclic structure exhibits the best compromise of properties. The preliminary results of a vapor fuels study indicate that the basic condensed bicyclic structure once again offers the most promise for an advanced vapor fuel. Research has indicated that a vapor fuel will extend the flight speed of advanced systems beyond mach 5. For greater speeds or for desirable additional cooling below mach 5, a type of endothermic fuel will be required. The primary contribution of the endothermic fuels program is that the feasibility of conducting this type of reaction under conditions to be encountered in advanced air-breathing systems is established and that the reaction products will perform satisfactorily in the combustor. (Author)

AD-278 058 Div. 10
(TISTA/SEB) OTS price $2.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
FLAME INHIBITION RESEARCH.
Quarterly progress rept., 1 Nov 61-31 Jan 62. Jan 62, 19p. incl. illus. tables, 29 refs.
(Rept. no. TG 376-5)
(Contract NOrd-7386)

Unclassified report

DESCRIPTORS: *Flames, *Combustion, Hydrogen, Oxygen, Monoxide, Methanes, Ethylenes, Hydrogen compounds, Bromides, Bromines, Iodides, Chlorides, Chlorine compounds, Fluorides, Carbon compounds, Free radicals, Chemical reactions, Atoms, Thermodynamics, Glass, Corrosion, Enthalpy, Tests, Test equipment, Laboratory equipment, Flame holders, Ceramic materials, Inhibition, Reaction kinetics.

This rept. includes:
CORROSION RESISTANT BURNER SYSTEM,
by W. E. Wilson, J. T. O'Donovan, and R. M. Fristrom. 31 Jan 62.

PRESSURE TRANSDUCER,
by J. T. O'Donovan, W. E. Wilson, and R. M. Fristrom. 1962.

THE CONCENTRATIONS OF ATOMIC AND FREE RADICAL SPECIES IN FLAMES,
by R. M. Fristrom and C. Grunfelder. 1962.

Flame systems being studied are H2-O2, CO-O2, Ch4-O2, C2H2-O2, and C2H4. Inhibitor radical systems being used are HBr-DBr, Br2, HI, HCl, CH3Cl, CF3Br, and CBr.

AD-278 126 Div. 10, 4
(TISTA/SEB) OTS price $1.60

Picatinny Arsenal, Dover, N. J.
MASS SPECTROMETRIC DETERMINATION OF DECOMPOSITION GASES FROM M15 AND M17 PROPELLANTS,
by Phillip Rochlin. June 62, 15p. incl. tables, 6 refs. (Technical memo. no. 1000)
(Proj. 5B04-21-008)

Unclassified report

DESCRIPTORS: *Propellants, *Solid rocket propellants, Gases, Analysis, Mass spectroscopy, Spectrographic analysis, Stability, Aging, Storage, Heat, Tests, Hazards, Decomposition.

Samples of M15 and M17 propellants were stored at 65.5 C in sealed surveillance bottles. Samples of the decomposition gases were taken at widely separated irregular intervals over a period of 3.5 years and analyzed mass spectrometrically. Infrared was used to confirm the presence of some components. Compared to the initial composition of the air, there is a depletion of O2 in most of the gas samples and a greater-than-normal amount of N2. Some samples contained a very close-to-normal proportion of O2, accompanied by a comparatively high initial pressure. There is apparently no relation between the amount of N2 and the initial pressure. All samples contained CO2, and all but two contained N2O. Of these two, one contained NO, the

DESCRIPTORS: *Accelerometers, Electrostatic fields, Humidity, Vibration, Equations, Coatings, Guidance, Guided missiles, Pellets.

Contents:
Effect of electrostatic charge and humidity on efflux rate
Vibration testing of beads
MoS2 coating of glass beads
Percent Mo on GE and Magnavox beads
Experimental plan for evaluation of bead and orifice diameter effects on efflux rate
Equations for theoretical efflux time for actual accelerometer designs
Beads available for efflux testing

AD-278 087 Div. 12
(TISTW/PCR) OTS price $2.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 7, 1-31 Dec 60, by W. J. Cimonetti. 15 Jan 61, 19p. incl. illus. tables (Rept. no. 61 APB 778-7)
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Accelerometers, Pellets, Electrostatic fields, Humidity, Equations, Guidance, Guided missiles, Manufacturing methods.

Contents:
Summary of findings of statistical analysis of esu and efflux rate for five different bead types exposed to various humidities
Bead breakage
Methods to manufacture glass beads
Beads available for testing
Mathematical equations

AD-278 088 Div. 12
(TISTW/PCR) OTS price $5.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 8, 1-31 Jan 61, by W. J. Cimonetti. 15 Feb 61, 52p. incl. illus. tables (Rept. no. 61 APB 778-8)
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Accelerometers, Pellets, Equations, Vibration, Stresses, Glass, Chemical analysis.

Contents:
Efflux testing
Glass analysis
Vibration testing of beads
Computer solution to theoretical efflux time equation
Bead stresses
Prints of the efflux meter

AD-278 090 Div. 12
(TISTW/PCR) OTS price $2.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 10, 1-31 Mar 61, by W. J. Cimonetti. 1 Apr 61, 21p. (Rept. no. 61 APB 778-10)
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Accelerometers, Pellets, Guided missiles, Guidance, Mass spectrometers, Infrared spectroscopy, Chemical analysis, Gases.

Contents:
Mass spectrometry
Infrared spectrophotometry
Wet chemical tests
Over-all summary of gas analysis
Mass spectrometer examination
Infrared examinations
Chemical determination

AD-278 091 Div. 12
(TISTW/PCR) OTS price $2.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 11, 1-30 Apr 61, by W. J. Cimonetti. 15 May 61, 22p. incl. illus. tables (Rept. no. 61 APB 778-11)
(Contract DA 36-034-ORD-3230)

DESCRIPTORS: *Accelerometers, Pellets, Guided missiles, Guidance, Equations.

Contents:
Destruction of weak beads
Design of annular orifice efflux meters

AD-278 092 Div. 12
(TISTW/PCR) OTS price $2.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 12, 1-31 May 61, by W. J. Cimonetti. 15 June 61, 18p. incl. illus. tables (Rept. no. 61 APB 778-12)
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Accelerometers, Pellets, Coatings, Guided missiles, Guidance.

Contents:
Effect of bead material and coating
Effect of approach angle
Chart of efflux meter sizes

AD-278 093 Div. 12
(TISTW/PCR) OTS price $5.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 13, 1-30 June 61, by W. J. Cimonetti. 15 July 61, 45p. incl. illus. tables (Rept. no. 61 APB 778-13)
(Contract DA 36-034-ORD-3230)
Unclassified report

DESCRIPTORS: *Accelerometers, Pellets, Guided missiles, Guidance, Humidity, Electrostatic fields, Glass, Equations.

Contents:
Effect of humidity and electrostatic charges on efflux rate for MoS sub 2 coated crown barium
Effect of humidity on soda lime glass
Effect of approach angle
Effect of orifice length
Effect of barrel diameter
Computer solution to conical orifice equations
Comparison of GT to the n-th power with Allen's equations
Effect of sphericity
Expanded annular orifice test plan

AD-278 161 Div. 12
(TISTA/GEC) OTS price $8.60

Aerospace Corp., El Segundo, Calif.
VARIABLE-LIFT RE-ENTRY AT SUPERORBITAL AND

Division 12 - GUIDED MISSILES

12. GUIDED MISSILES

AD-277 955 Div. 12, 20
(TISTM/EJH) OTS price $.75

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ELECTROSTATIC SHIELDING OF HIGH ENERGY PROTONS.
Rept. for May-Dec 61, on The Chemistry and Physics of Materials,
by Thomas W. Bailey. Mar 62, 17p. incl. illus. 13 refs.
(Proj. 7360)
(ASD TDR 62-244) Unclassified report

DESCRIPTORS: *Shielding, *Electrostatic generators, *Electrostatics, Feasibility studies, Structures, Design, Spaceships, Space capsules, Cosmic rays, Space environmental conditions, Protons, Theory, Stresses, Mathematical analysis.

Electrostatic shielding was studied to determine if it should be considered for protecting manned space vehicles against solar cosmic rays. It was concluded that electrostatic shielding is feasible and that it has some advantages over other types of shields. However, considerable applied research will be necessary. (Author)

AD-278 055 Div. 12, 27, 14
(TISTA/SEB) OTS price $12.50

Aerojet-General Corp., Azusa, Calif.
ROCKETS IN SPACE ENVIRONMENT. PHASE II. INDIVIDUAL COMPONENT INVESTIGATION.
Phase rept., 1 Oct 61-30 Mar 62,
by P. D. Gray, J. D. O'Donnell and others.
11 Apr 62, 173p. incl. illus. tables, 9 refs.
(Rept. no. 2263)
(Contract AF 04(611)7441, Proj. 3058-03)
Unclassified report

DESCRIPTORS: *Space environmental conditions, *Rocket motors, *Liquid rocket propellants, *Seals, *Materials, *Valves, Fuel systems, Ultraviolet radiation, Infrared radiation, Meteorites, Solar energy, Temperature, Aluminum, Heat transfer, Insulating materials, Mathematical analysis, Propellant tanks, Thermionic emission, Polymers, Laminates, Protons, Methyl hydrazines, Hydrazines, Impact shock, Radiation effects.

Components and materials having use or potential for use in space propulsion systems were tested according to plans formulated during Phase I. Test data indicated that, in many cases, materials and components now used in liquid-propellant propulsion systems would be suitable for space applications. (Author)

AD-278 060 Div. 12, 17, 1
(TISTA/GEC) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
EVALUATION OF SHINGLE INSULATION FOR HIGH TEMPERATURE APPLICATIONS.
Rept. for 15 Dec 60-30 Sep 61,
by M. L. Hill and J. M. Akridge. 15 Dec 61, 11p. illus. tables, refs. (Rept. no. TG-428-2)
(Contract NOrd-7386)
(WAL TR 786.2/1-1) Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Thermal insulation, *Refractory materials, Airframes, Sheets, Rocket motor nozzles, Stainless steel, Metal plates, Shock waves, Model tests, Wind tunnel models, Supersonics, Thermal conductivity, Heat resistant alloys, Design, Aerodynamic heating.

Investigation continued on a thermal insulation which has possible applications in protecting structural components, including rocket nozzles, from aerodynamic and combustor heating. The insulation is made up of thin overlapping strips of refractory materials bonded to the structure at an acute angle and is referred to as shingles. Thermal conductivity measurements of several stainless steel panels having variations in stagger angle and spacing of shingles are reported. Results of structural tests in aerodynamic environment including simulated conditions of Mach 1.6 at sea level and Mach 5 at 95,000 ft, are reported. Several designs of shingles survived these conditions and withstood more severe tests in which artifically generated shock waves impinged on the insulated surface. (Author)

AD-278 078 Div. 12, 13, 7
(TISTA/SEB) OTS price $10.50

Douglas Aircraft Co., Inc., Long Beach, Calif.
FEASIBILITY STUDY AND INVESTIGATION OF THERMOELECTRIC POWER GENERATION AND COOLING FOR FLIGHT VEHICLES.
Final summary rept. on Phase 1, 1 Mar-1 Apr 62,
by H. L. Hall, L. B. Buss and others. 1 Apr 62, 137p. incl. illus. tables, 9 refs. (Rept. no. THMR-25-11; rept. no. 11)
(Contract NOw 61-0404-t)
Unclassified report

DESCRIPTORS: *Thermoelectricity, Power supplies, Aircraft, Supersonic planes, Military requirements, Temperature, Electronic equipment, Cockpits, Heat exchangers, Jet planes, Heat transfer, Heat, Guided missiles, Heat production, Mathematical analysis, Refrigeration systems, Electric power production, Cooling.

The feasibility of thermoelectric cooling systems for flight vehicles was studied. Applications considered were occupied compartments in the aircraft and avionic equipment cooling. Thermoelectric cooling systems compare favorably with existing cooling systems for subsonic aircraft electronic equipment, having a cooling load up to 1.5 kw and an allowable temperature level equivalent to MIL-E-5400, class I. Thermoelectric cooling loads greater than 1.5 kw are feasible for subsonic aircraft electronic equipment having an allowable temperature level higher than specified in MIL-E-5400, class I (such as class II equipment). An improvement of 43% in thermoelectric material properties doubles the feasible range of cooling loads for class I equipment to 3 kw. Special classes of equipment requiring temperature levels lower than class I also become feasible for cooling loads under 3 kw; with the maximum feasible cooling load depending upon the maximum allowable temperature of the equipment. Cooling of cockpits or of electronic equipment for supersonic airplanes is not feasible with current thermoelectric materials. (Author)

AD-278 086 Div. 12
(TISTW/PCRJ) OTS price $2.60

General Electric Co., Burlington, Vt.
STUDY OF PARAMETERS WHICH AFFECT PELLET FLOW TYPE ACCELEROMETERS.
Monthly progress rept. no. 6, 1-31 Nov 60,
by W. J. Cimonetti. 15 Dec 60, 25p. incl. illus. tables (Rept. no. 61 APB 778-6)
(Contract DA 36-034-ORD-3230)
Unclassified report

Final rept.,
by R. R. Robinson. Mar 62, 187p. incl. illus. tables, 14 refs.
(Contract AF 29(601)2596, Proj. 1080)
(AFSWC TDR 62-1) Unclassified report

DESCRIPTORS: *Underground structures, *Cylindrical bodies, Atomic bomb explosions, Blast, Shock waves, Loading, Soils, Theory, Compression shock, Tests, Mathematical analysis, Test methods, Instrumentation, Deformation, Stresses.

Some aspects of the problem of determining the response of underground cylindrical tunnel and silo linings to blast-induced loading are presented. The studies include the effects on silo linings of differential horizontal soil displacements, vertical skin-friction forces generated by vertical compression of the surrounding soil, and axial response of a silo with integral cover to the blast-induced cover loading. A theoretical method for estimating the forces acting on a cylindrical structure subjected to air blast-induced ground shock is presented. The radial forces on the surface of the cylinder consist of the undisturbed free-field pressure component plus pressures proportional to the radial velocity and displacement of the structure relative to the free-field particles. The effect of virtual mass, foundation modulus, and damping on the response was studied by obtaining solutions appropriate for tunnel and silo linings. Static tests on three metal, cylindrical tunnel models buried in dense Ottawa sand are presented and compared with the theoretical method. (Author)

AD-278 118 Div. 13, 14
(TISTE/CDM) OTS price $8.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
STATIC AND DYNAMIC LOADING OF PRETENSIONED CONCRETE BEAMS.
Final rept. on Type C,
by S. K. Takahashi. 15 June 62, 87p. incl. illus. tables, 15 refs. (Technical rept. no. 192)
Unclassified report

DESCRIPTORS: *Reinforced concrete, *Beams, *Reinforcing steel, Vibration, Blast, Shear stresses, Loading, Theory, Test equipment, Tests, Bonding, Simulation, Stresses, Deflection, Mathematical analysis, Structures.

A study was made to determine how flexural members should be designed, how to gain the greatest resistance to blast loading, where they should be used, and the best way to destroy structures composed of such members. Nine simply supported pretensioned beams were tested in the blast simulator either statically or dynamically. In the dynamic tests the beams were subjected to long- and short-duration loading. As expected, the load capacity of the beams subjected to short duration loads was greater than that of those subjected to long-duration loads. The deflection time traces showed that no tensile stresses occurred in the top fiber for any of the loads applied and that a permanent deformation can be considered negligible for loads less than 85% of the ultimate load. A method of predicting the static ultimate deflection is presented and applied to one of the beams. The experimental data is compared with the theory. All of the statically tested beams failed in bond near the supports. In the dynamic tests, two beams failed by concrete compression at mid-span, and the rest failed in bond. A solution for dynamic response, which includes damping, is shown and applied to one of the tests. (Author)

AD-278 219 Div. 13, 20
(TISTE/CDM) OTS price $21.00

Illinois U. Engineering Experiment Station, Urbana.
INVESTIGATION OF RESISTANCE AND BEHAVIOR OF REINFORCED CONCRETE MEMBERS SUBJECTED TO DYNAMIC LOADING, PART III.
Technical rept.,
by A. Feldman, W. A. Keenan, and C. P. Siess.
1 Feb 62, 367p. incl. illus. tables, 33 refs.
(Contract DA 49-129-eng-344)
(DASA-1259) Unclassified report

DESCRIPTORS: *Reinforced concrete, *Beams, *Reinforcing steel, Load distribution, Test equipment, Deformation, Mathematical analysis, Blast, Analog computers, Instrumentation, Test methods, Tests, Measurement, Atomic bomb explosions, Structures, Simulation, Shear stresses, Stresses.

An investigation was made to obtain, by means of tests, information which will contribute to a better understanding and more accurate prediction of the strength and behavior of reinforced concrete structures subjected to dynamic loading. The immediate objective was the determination of the resistance and behavior of simple-span reinforced concrete beams subjected to impulsive loading. To accomplish this, tests of beams and of reinforcing bar coupons were made and the resulting data analyzed. The practicability of an existing method of computing the resistance of dynamically loaded reinforced concrete beams was also checked. To this end, comparisons were made between the test results and the prediction of the method of analysis. (Author)

AD-278 285 Div. 13, 22
(TISTE/CDM) OTS price $15.50

Illinois U., Urbana.
THE DYNAMIC RESPONSE OF SHALLOW-BURIED ARCHES SUBJECTED TO BLAST LOADING.
Doctoral thesis,
by Caryll R. Whipple. June 61, 223p. incl. illus. tables, 25 refs.
(Contract AF 29(601)2591, Proj. 1080)
Unclassified report

DESCRIPTORS: *Underground structures, *Soils, *Atomic bomb damage, Loading, Blast, Theory, Theses, Atomic bomb explosions, Parabolic bodies, Shock waves, Mathematical analysis, Load distribution.

A study was made of the effectiveness of the surrounding soil in restraining the lateral movement of shallow-buried arches subjected to blast overpressures from a nuclear explosion. The theory is developed for parabolic arches with circular or barrel arches included as a special case. It can be applied equally well to arches oriented with their longitudinal axes perpendicular to or parallel to the direction of travel of the blast wave. The arch is considered to be buried near the surface of a semi-infinite soil mass. The depth of cover over the crown is limited to one-half of the arch span. The two-hinged rather than the fixed arch is selected as representing more closely the shallow-buried arch structures used in full-scale nuclear tests to date. While these structures were not actually pinned at the arch abutments, their behavior under blast loading appears to resemble more closely the pinned than the fixed case. The principal variables studied in the numerical examples include: (1) depth of cover, (2) overpressure loading, (3) arch material, and (4) arch span. (Author)

ORBITAL SPEEDS,
by H. E. Wang and S. T. Chu. Apr 62, 91p. incl. illus. 3 refs. (Rept. no. TDR-930(2570-20)TN-2)
(Contract AF 04(647)930)
(DCAS TDR 62-105) Unclassified report

DESCRIPTORS: *Re-entry vehicles, *Lift, *Hypervelocity vehicles, *Re-entry aerodynamics, Drag, Hypersonics, Aerodynamic configurations, Dynamics, Oscillation, Spaceships, Space capsules, Orbital flight paths, Space flight, Manned, Deceleration, Mathematical analysis.

Analytical solutions were obtained for a type of variable-lift modulation applicable to a lifting body entering the atmosphere from superorbital and orbital speeds. The variable-lift modulation analyzed results in nonoscillatory trajectories and achieves a smooth transition into nominal glide phases such as constant altitude, constant flight path angle, constant dynamic pressure or any other glide desired. Simple closed-form formulas were derived which permit quick estimation of the peak deceleration and the altitude where it occurs, and the required lift modulation necessary for any set of prescribed transition conditions. These approximate formulas show the explicit dependence of trajectory quantities in terms of re-entry conditions, vehicle aerodynamic characteristics, as well as parameters defining the lift modulation. It can be shown that the analytical solutions obtained in this paper include constant lift-drag solutions and, in the case of variable lift, a continuous lift modulation program instead of a stepwise change of lift and drag. (Author)

AD-278 162 Div. 12
(TISTA/GEC) OTS price $4.60

Aerospace Corp., El Segundo, Calif.
LIMIT CYCLES IN REACTION JET ATTITUDE CONTROL SYSTEMS SUBJECT TO EXTERNAL TORQUES,
by P. R. Dahl, L. K. Herman, and G. T. Aldrich. 16 Apr 62, 38p. incl. illus. 14 refs. (Rept. no. TDR-930(2550-20)TN-1)
(Contract AF 04(647)930)
(DCAS TDR 62-93) Unclassified report

DESCRIPTORS: *Control systems, *Satellite vehicles, *Stabilization, Gravity, Aerodynamics, Magnetic fields, Satellite vehicle trajectories, Fuel consumption, Jets, Torque, Theory.

The effects of external torques such as gravitational, aerodynamic, magnetic, etc., experienced by orbiting satellites, on the limit cycle operation of a reaction jet attitude control system, were studied. Expressions were developed for the impulse requirements of the limit cycle operation of a system under the action of external torques. Among the results reported is the interesting fact that destabilizing torques can be used to reduce impulse required below that of a torque free system. (Author)

AD-278 204 Div. 12, 7
(TISTA/WAW) OTS price $9.10

General Dynamics/Fort Worth, Tex.
STUDY OF ADVANCED FLIGHT-VEHICLE POWER-UTILIZATION SYSTEMS.
Final rept., 21 Mar 61-30 June 62.
June 62, 100p. incl. illus. tables (Rept. no. FZK-148)
(Contract AF 33(616)8179, Proj. 3145)
(ASD TDR 62-591) Unclassified report

DESCRIPTORS: *Satellite vehicles, *Spaceships, *Electric power production, Auxiliary power plants, Electric propulsion, Radio communication systems, Atmosphere entry, Terrestrial magnetism, Magnetohydrodynamics, Thermoelectricity, Aerodynamics, Masers, Lasers, Analysis.

An unconventional approach toward utilization of vehicle power is presented. Brief mission profiles are given for six manned and unmanned air and space craft to give the schedule of operation of systems which utilize power. Greater detail is presented on the power utilization of two of these, the unmanned reconnaissance satellite and the manned lunar-landing and return vehicle. A general discussion is presented on power sources intrinsic and extrinsic to vehicles, and a forecast is shown for chemical, solar, and nuclear sources. The application of the morphological method to the development of new concepts is discussed and examples given in an appendix of several ''morphological boxes''. Some of the concepts that developed during the course of the study are also given in appendices. In addition, the appendices contain general reviews of Electromagnetic Wave Amplification by Stimulated Emission of Radiation (EWASERS), radio space communications, and electrical propulsion. It was concluded that a modified morphological approach offers a better framework for conceiving advanced concepts. Recommendations are made for further study and development of the method and new concepts. (Author)

AD-278 288 Div. 12, 2
(TISTA/VGW) OTS price $2.60

AVCO Everett Research Lab., Mass.
THE ALTITUDE OF STABILIZATION FOR SLOWLY TUMBLING RE-ENTRY VEHICLES,
by R. A. Norling. June 61, 15p. incl. illus. 2 refs. (Research rept. no. 134)
(Contract AF 04(647)278)
(AFBSD TN 61-27) Unclassified report

DESCRIPTORS: *Re-entry vehicles, *Satellite attitude, Space flight, Tumbling, Re-entry aerodynamics, Mathematical analysis, Celestial mechanics, Stabilization.

An analysis is made to identify the parameters which determine the altitude of stabilization defined as the altitude at which the angle of attack rate first vanishes for slowly tumbling re-entry vehicles. The analysis is limited to small tumble rates and angles of attack which allow the assumptions of $C_m = C_{m_a}\alpha$ and C_{m_a} = constant respectively. An expression is derived which implicitly relates the altitude of stabilization to (1) the initial descent velocity, $V_E \sin \gamma$, (2) the atmospheric scale height, (3) a vehicle stability parameter, $C_{m_a} Al/I$, and (4) the quantity $(a_o/\dot{a}_o)$. The important result is the fact that the initial angle of attack and initial tumble rate, i.e., a_o and $\dot{a}_o$ respectively, appear only as a ratio, $a_o/\dot{a}_o$, the remaining parametric quantities being properties of the vehicle, the atmosphere, and the trajectory. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-278 063 Div. 13
(TISTE/CDM) OTS price $13.00

Armour Research Foundation, Chicago, Ill.
THE INVESTIGATION OF SILO AND TUNNEL LININGS.

converting these strains to stresses. From a plot of diameter change versus circumferential stress the allowable diameter change was taken as .09 to .12 inch using one value of modulus and .14 to .18 inch using the other. The allowable diameter change established by combining these results with the value of .13 inch predicted by a structural analysis is .12 inch. (Author)

AD-278 103 Div. 14, 25
(TISTM/EJH) OTS price $1.00

Illinois U., Urbana.
RESEARCH ON ABSORBEFACIENT SURFACES.
Final rept., 1 Mar-1 Sep 60 on Research Study on Absorbefacient Surfaces for the 1000 F Temperature Range,
by Julian H. Lauchner, Dwight G. Bennett and others. Apr 62, 31p. incl. illus. tables, 5 refs. (Contract AF 33(616)7032, Proj. 1347)
(ASD TDR 62-173) Unclassified report

DESCRIPTORS: *Coatings, *Enamel coatings, *Thermal insulation, *Phosphate coatings, Phosphates, Binders, Glass, Oxides, Carbonates, Carbon black, Inorganic substances, Chromium alloys, Heat resistant alloys, Heat transfer, Thermal radiation, Thermal conductivity, High temperature research, Surfaces, Nickel alloys, Absorption.

Research and development of absorbefacient surfaces capable of elevated temperature performances was the objective of this study. Two types of coating surfaces were developed during the study program; namely, vitreous and non-vitreous phosphate bonded material. Vitreous coating systems exhibited excellent thermal shock behavior when repeatedly subjected to radiant energy. Phosphate bonded coating systems were capable of high temperature exposures above the service limit of Inconel X. Heat transfer measurements of coated and uncoated metal specimens indicated backside temperature differentials of the order of 600 F when exposed to a radiant energy source at 1900 F. (Author)

AD-278 121 Div. 14
(TISTM/JSM) OTS price $1.25

DeBell and Richardson, Inc., Hazardville, Conn.
RESEARCH AND DEVELOPMENT FOR THE IMPROVEMENT OF THE STRENGTH AND MODULUS OF CONTINUOUS FILAMENT WOUND CYLINDRICAL STRUCTURES THROUGH APPLICATION OF QUALITY CONTROL.
Final rept.,
by William J. Eakins. 31 May 62, 43p. incl. illus. tables, 4 refs.
(Contract NOrd-18610)
Unclassified report

DESCRIPTORS: *Filament wound construction, *Cylindrical bodies, *Quality control, Coatings, Finishes, Resins, Laminates, Laminated glass, Glass, Glass textiles, Epoxy resins, Rocket cases, Amines, Silanes, Binders, Structures.

Using flexural testing, ignition tests, boil tests and photomicrographs, studies were made of parallel filament wound 18 in.-diameter hoops of glass content varying from 65% by volume, 80% by weight to 78% by volume, 88% by weight. The mechanism of failure in flexure was found to be in the non-glass region whether initiation of this failure was on the tension side, on the compression side, or in the neutral plane of the bent curved piece. (Author)

AD-278 156 Div. 14, 30
(TISTM/SEB) OTS price $1.60

Solar Aircraft Co., San Diego, Calif.
EXPLORATION AND EVALUATION OF NEW GLASSES IN FIBER FORM.
Bimonthly progress rept. no. 2, 16 Jan-15 Mar 62,
by Gunther K. Schmitz. 26 Mar 62, 12p, incl. illus. table (Technical memo. no. 197)
(Contract Nonr-365400)
Unclassified report

DESCRIPTORS: *Glass textiles, Tensile properties, Mechanical properties, Test equipment, Ceramic fibers, Tests, Test methods.

Tensile strength measurements were conducted on six different lengths of commercial E glass, ECG 150-1/0. The length effect on breaking strength was determined; this effect is expressed by the mechanical damage coefficient. Test results point to refinement of test procedures, especially fiber separation technique. (Author)

AD-278 247 Div. 14, 8, 12, 30
(TISTM/EJH) OTS price $2.60

Ohio State U. Research Foundation, Columbus.
NONDESTRUCTIVE SYSTEM FOR INSPECTION OF FIBER GLASS REINFORCED PLASTIC MISSILE CASES.
Quarterly technical rept. no. 1, 29 June-28 Sep 61,
by Merle L. Rhoten, Jay P. Mitchell, and Robert C. McMaster. 20 Oct 61, 26p. incl. illus.
(Contract DA 33-019-ORD-3670, Proj. 5B93-32-004)
(WAL TR 142.5/2) Unclassified report

DESCRIPTORS: *Filament wound construction, *Glass textiles, *Image tubes, Television cameras, X rays, Beryllium, Materials, Composite materials, Epoxy resins, Laminates, Radiographic analysis, Non-destructive testing, Rocket cases, Design.

The purpose of this program is to develop a television X-ray imaging system for the nondestructive inspection of fiber glass reinforced plastic missile case walls and materials. The development of X-ray-sensing television camera tubes, equipped with beryllium windows, is essential for fiber glass inspection. Previous efforts to develop such tubes indicated the existence of problems of target poisoning and target deterioration due to heat effects. During this research period, an X-ray-sensing, beryllium-window tube has been fabricated that appears to have overcome these problems. A study has been initiated to determine the optimum target material thickness for the inspection of fiber glass missile cases. (Author)

AD-278 265 Div. 14
(TISTM/SEB) OTS price $1.60

RIAS, Inc., Baltimore, Md.
THE EFFECT OF PRIOR DEFORMATION AND RECOVERY ON THE DEFECT CONCENTRATION INCREASE DURING PLASTIC DEFORMATION,
by Howard R. Peiffer. June 62, 12p. incl. illus. 6 refs. (Technical rept. no. 1)
(Contract Nonr-370700)
Unclassified report

DESCRIPTORS: *Copper, *Aluminum, Electrical properties, Deformation, Stresses, Plasticity, Energy, Test methods, Theory, Tests, Resistance.

The parameter c, the concentration of impurity atoms and the initial condition of the metal, and the parameter n, a constant, were studied

Division 14 - MATERIALS (NON-METALLIC)

AD-278 351 Div. 13, 31
(TISTE/CAM) OTS price $1.50

RCA Defense Electronic Products, Camden, N. J.
THERMOELECTRIC AIR CONDITIONER FOR SUBMARINES.
Final rept. on Phase 2,
by B. Shelpuk and P. E. Wright. 1961, 52p. incl. illus. tables.
(Contract NObsr-77123)
Unclassified report

DESCRIPTORS: *Air conditioning equipment, *Ventilation, *Thermoelectricity, *Submarines, Cooling, Design, Materials, Manufacturing methods, Quality control, Model tests, Equations, Theory, Heat transfer, Heat exchangers, Shipborne, Test equipment, Test methods.

The design of a 1-ton water-to-water thermoelectric cooler is described in detail. Its performance can be extrapolated exactly from the measured performance of a 1/6-ton modular unit. The flexibility inherent in the design of the modular unit permits increases in size with simple piping arrangements. The analytical design of a water-to-water thermoelectric cooler was completely verified by experimental data taken from an integral modular unit of a 1-ton system. The unit has a capacity of 0.189 ton of cooling with a coefficient of performance of 1.24. Maximum reliability was demonstrated through the fired-ceramic electrical insulation approach. Techniques that permit a 75% reduction in thermoelectric material requirements were demonstrated. (Author)

14. MATERIALS (NON-METALLIC)

AD-278 009 Div. 14
(TISTM/JSM) OTS price $.75

Union Carbide Corp., Parma, Ohio.
RESEARCH STUDY TO DETERMINE THE PHASE EQUILIBRIUM RELATIONS OF SELECTED METAL CARBIDES AT HIGH TEMPERATURES.
Rept. for period ending 30 Apr 61,
by R. T. Dolloff and R. V. Sara. May 61, 19p. incl. illus. tables, 13 refs.
(Contract AF 33(616)6286, Proj. 7350)
(WADD TR 60-143, pt. 2)
Unclassified report

DESCRIPTORS: *Carbides, *Metallic compounds, *Tungsten compounds, *Phase studies, Eutectics, Tungsten, Carbon, Solubility, Alloys, High temperature research, Tungsten alloys, Carbon alloys, Refractory materials, Ceramic materials.

The work reported is the result of an investigation of phase equilibria in the binary system, tungsten-carbon. A tentative phase diagram is presented which differs significantly from the one proposed by Sykes in 1930 and which is generally accepted today. The data were obtained by high-temperature differential thermal analysis and classical quenching procedures, both supplemented by metallographic, x-ray, and chemical techniques. Results for the tungsten-carbon binary system indicate a eutectic between W and W2C at 2735 C, and a eutectic between W5C3 and C at 2765 C. The W2C lattice accommodates 72 and 74 atomic per cent W at 2475 degrees and 2735 C, respectively. Carbon solubility is evident only at 2540 C, the eutectoid temperature. A new phase, W5C3, was discovered which is stable only above 2540 C. WC decomposes at 2730C into W5C3 and C.

AD-278 047 Div. 14
(TISTM/REB) OTS price $2.00

New York U. Coll. of Engineering, N. Y.
RESINS BASED ON COMPLEX FORMATIONS WITH ORGANO-TITANATES.
Final rept.
15 June 62, 73p. incl. tables, 3 refs.
(Contract NOw 61-0433-d; Continuation of Contract NOa(s) 60-6006-c)
Unclassified report

DESCRIPTORS: *Heat resistant polymers, *Resins, *Titanates, *Metalorganic compounds, *Epoxy resins, *Titanium compounds, *Polymers, Silicone resins, Silicones, Synthesis, Complex compounds, Polymerization.

Contents:
Development of organo titanate resins
- Preparation of titanate epoxides with vinyl cyclohexene dioxide
- Preparation of titanate epoxides with dicyclo diepoxy carboxylate
- Further activation with dibutyl maleate or fumarate
- Using the titanate epoxide distillate to activate other resins
- Use of small amounts of Al powder to increase the heat stability of the resins
- Various pigmented titanate resins

Modification of the resins by lowering their fluid phase
- Development of the phase separations
- Tests of the resins
- Modification of these resins with a metal borate
- Modification with a tetraisopropyl titanate/tungoil product
- The step-by-step preparation of larger quantities of the resins

Literature review on the formation of unsaturated compounds based on metalorganic materials and their polymers
- Polymers of silicone metal organics
- Titanium-silicone compounds
- New titanium compounds
- Complexes of other metals

AD-278 096 Div. 14, 30
(TISTM/SEB) OTS price $3.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
THEORETICAL AND EXPERIMENTAL ANALYSIS OF STRESSES AND STRAINS IN A GLASS-REINFORCED PLASTIC WINDSHIELD,
by Julius I. Gnapp and Karl J. Taglier. June 62, 36p. incl. illus. tables, 3 refs. (Technical rept. no. FRL TR-49)
(Proj. 512-15-018) Unclassified report

DESCRIPTORS: *Windshields, *Strain gages, Theory, Deformation, Stresses, Load distribution, Reinforcing materials, Plastics, Glass, Tests, Test methods, Mathematical analysis, Mechanical properties, Test equipment.

The maximum initial departure from circularity to be permitted at the mouth of the XM-28 practice windshield is derived from theoretical considerations and from the results of two independent experimental investigations. In the first experimental method the change in diameter was plotted against simulated field loads that were increased in steps until rupture occurred. The average diameter change accompanying an arbitrarily selected safe load of 100 lbs was .15 inch. For the second experimental method SR-4 strain gages were mounted at the rim of the windshield and the circumferential strains induced by simulated field loads were measured. Two values of the modulus of the material were available for

various inequalities by which the most desirable test policy can be determined. The inequalities are functions of the reliabilities of the population, the monitoring, the testing, and the degradation of reliability due to monitoring and testing. (Author)

AD-278 072 Div. 15
(TISTP/GRW) OTS price $1.60

Boeing Scientific Research Labs., Seattle, Wash.
ENCLOSURE THEOREMS FOR EIGENVALUES AND PROBABILITY INEQUALITIES,
by Albert W. Marshall and Ingram Olkin. Apr 62, 12p. 10 refs. (Mathematical note no. 255; Document no. D1-82-0159)
(In cooperation with Applied Mathematics and Statistics Lab., Stanford U., Calif.)
Unclassified report

Also available from the author.

DESCRIPTORS: *Matrix algebra, *Inequalities, Integral equations, Probability.

AD-278 077 Div. 15, 30
(TISTP/FR) OTS price $1.60

Diamond Ordnance Fuze Labs., Washington, D. C.
NOTE ON SCALING FIRST-ORDER DIFFERENTIAL EQUATIONS FOR AN ANALOG COMPUTER,
by Arthur Hausner. 20 June 62, 18p. 3 refs. (DOFL rept. no. TR-1048)
Unclassified report

DESCRIPTORS: *Differential equations, *Analog computers.

A technique was developed for scaling first-order differential equations for solution on an analog computer. Its advantage is that the magnitude of the derivatives of all functions being produced by integrations do not have to be scaled. Time scaling and other principles of analog computation become clearer. (Author)

AD-278 117 Div. 15
(TISTP/FR) OTS price $1.60

Naval Postgraduate School, Monterey, Calif.
OPTIMUM SHIP ROUTING. II,
by Frank D. Faulkner. May 62, 13p. 8 refs. (Research paper no. 33)
(Sponsored by Office of Naval Research)
Unclassified report

DESCRIPTORS: *Ships, Radioactive fall-out, Programming, Differential equations, Calculus of variations, Digital computers.

A method is given for determining optimum ship routes on a digital computer. A ship is assumed to be in a fallout field whose intensity is a known function f(x,y,t) of position and time. A typical problem is that of choosing a route to a point where f is less than or equal to fm, the maximum intensity that can be tolerated indefinitely. The route is to be such as to minimize the dose; the terminal time and point are not specified. The problem of sending the ship to a given point with z minimized is also discussed. These are equivalent to corresponding problems of choosing a route to minimize the probability of detection while going through a region where the probability of detection is a known function of position and time. (Author)

AD-278 142 Div. 15
(TISTP/TL) OTS price $3.60

Travelers Research Center, Inc., Hartford, Conn.
OPTIMUM SUBDIVISION OF A VARIABLE BY THE METHOD OF D. R. COX,
by Joseph G. Bryan and John R. Southan. Apr 62, 33p. incl. illus. tables (Scientific rept. no. 3; TRC-21)
(Contract AF 19(604)5207, Proj. 8628)
(AFCRL 62-492) Unclassified report

DESCRIPTORS: *Analysis of variance, *Groups (Mathematics), *Statistical distributions, *Probability, *Simultaneous equations, Integral equations, Partial differential equations, Functions, Matrix algebra.

In the Journal of the American Statistical Association (Dec. 1957), D. R. Cox presented a method of dividing a continuous variable into k classes so that the grouping error is minimized for a stated k. He gave the points of subdivision of a unit normal variable for values of k from 2 to 6. However, he did not state the explicit equations needed to apply his method for higher values of k. This analysis facilitates the extension to higher values of k. The basic equations are derived, a feasible method of solving them is given, and the procedure is illustrated in detail for k = 7 and k = 8. (Author)

AD-278 144 Div. 15
(TISTP/TL) OTS price $3.60

Uppsala U. (Sweden).
RESEARCH ON INTERPOLATION PROBLEMS,
by Lennart Carleson. 1 June 62, 37p. 7 refs.
(Contract AF 61(052)238)
(AFOSR-2972) Unclassified report

DESCRIPTORS: *Topology, *Functional analysis, *Functions, Solar corona, Sequences, Series, Green's function, Complex numbers, Algebra, Numbers, Inequalities, Integral equations.

AD-278 211 Div. 15
(TISTP/FR) OTS price $10.50

Minneapolis-Honeywell Regulator Co., Minn.
MATHEMATICAL FORMALISMS OF COMMAND, CONTROL, AND COMMUNICATION SYSTEMS,
by R. C. Kiene. 25 Oct 61, 127p. incl. illus. tables, 42 refs. (MH MPG rept. no. 1024-TR1)
(Contract AF 30(602)2505)
(RADC TDR 62-328) Unclassified report

DESCRIPTORS: *Programming, *Linear programming, *Communication systems, Management engineering, Information theory, Combinatorial analysis, Applied mathematics, Logistics.

Mathematical formalisms are presented for the description and optimization of Management, Communication, Information, and Decision Systems which comprise the over-all Command and Control Systems (L-Systems). Linear graph theory and linear programming are utilized for the display and optimization of management functions consisting of, the design, development, and augmentation of L-Systems. Communication Systems are synthesized optimally by network synthesis techniques, optimum flow theory, linear and dynamic programming, and combinatorial analysis. Information Systems performing computation and data processing are described by linear graph theory. A logical net controller concept is developed which can optimally control the processing events and subsystems in an information system and message routing in a communication system. The individuals and displays comprising the Decision System are described by linear graph theory. (Author)

for the power equation delta rho equals c sigma to the nth power, where delta rho is the elongation increment associated with the change in resistivity. Resistivity measurements on Cu and Al were made before and after stretching the metal pieces to a predetermined strain. The increase in resistivity of copper with cold work obeys the power law. The exponent n and the constant multiplier c vary in Cu with the increase in the ratio of the new resistivity (rho') to the old resistivity (rho). This resistivity ratio represents the internal state of the copper. Both c and n decrease with the increase in the ratio and c is related linearly to n. The decrease in n results in a higher defect production rate initially, but later the rate falls below that observed for material with higher n. The recovery process appears to enhance the rate of defect production and thereby the work hardening rate.

AD-278 271 Div. 14, 26, 27
(TISTM/EJH) OTS price $2.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
SEALS FOR 5200 PSI AIR SYSTEMS.
Final rept.,
by R. D. Ford and A. E. Barrett. 10 July 62, 25p. incl. illus. 16 refs. (Rept. no. 28-10)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Elastomers, *Rubber seals, *High pressure compressors, Air, High pressure research, Lubricants, Greases, Molybdenum compounds, Sulfides, Solids, Corrosion inhibition, Metals, Mechanical properties, Tensile properties, Tests, Seals.*

The objectives of this investigation were (1) to develop elastomeric seals for 5200 psi air systems wherein the compressors are lubricated with either petroleum-base fluids or with phosphate-ester fluids, and (2) to prepare a specification for these seals. A Viton B stock (377-112) was previously developed and shown by performance tests to be very suitable for this purpose. However, O-rings of this stock corroded steel and bronze under humid conditions. This problem was solved by washing the O-rings with soap and water prior to placing them in contact with the metals. Dynamic and static performance tests of 377-112 O-rings lubricated with dry MoS2 verified the suitability of this stock and showed that this lubricant was as satisfactory as MIL-L-4343A grease currently used in high pressure air systems. A specification was prepared based on tests conducted on specimens of stock 377-112. (Author)

AD-278 297 Div. 14, 17, 31
(TISTM/JSM) OTS price $1.60

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DAMPING OF STEEL PLATES BY SOUNDAMP TYPE RAL,
by J. W. Hollister. 18 July 62, 11p. incl. illus. 9 refs. (Rept. no. 94-40)
(Proj. S-F013-13-01)
Unclassified report

DESCRIPTORS: *Steel, *Damping, *Metal plates, Ship noise, Noise, Vibration, Rubber, Lead, Air, Ships.

Soundamp type RAL (rubber-air-lead) has been evaluated for damping the vibration of steel plates. RAL material, developed by the U.S. Navy Underwater Sound Laboratory, consists of rubber tiles each 12 x 12 x 1/2 inch with 619 enclosed cylindrical pockets containing no. 8 lead shot. RAL has been used to reduce the radiation of self-generated noise from the ship to the water. Percent critical damping values were determined at atmospheric pressure for RAL on 3/8-inch thick circular steel plates over a frequency range of about 800 to 14,000 cps at 30 to 90 F. The range of frequencies, at each testing temperature, where the percent critical damping was 3% or higher was as follows: 1 to 8.9 kcps at 30 F, 0.8 to 6.1 kcps at 40 F, below 0.8 to 4.7 kcps at 74 F and below 0.8 to 3.8 kcps at 90 F. (Author)

AD-278 356 Div. 14, 17, 31
(TISTM/EJH) OTS price $1.50

Naval Civil Engineering Lab., Port Hueneme, Calif.
PROTECTIVE COATINGS FOR STEEL PILING: RESULTS OF 30-MONTH TESTS,
by R. L. Alumbaugh. 29 June 62, 52p. incl. illus. tables, 3 refs. (Technical rept. no. R 194)
Unclassified report

DESCRIPTORS: *Plastic coatings, *Coatings, *Weatherproofing, *Steel, Deterioration, Abrasion, Sea water, Vinyl radicals, Resins, Aluminum coatings, Varnishes, Phenolic resins, Antifouling coatings, Zinc coatings, Coal tar, Synthetic rubber, Asphalt, Structures, Underwater, Steel, Corrosion inhibition.

Eight coating systems selected from a previous study were evaluated as protective coating systems for steel piles. The systems were applied to both sheet and "H" piles. The coated piles were driven in the surf of the outer harbor at Port Hueneme and exposed for periods of 12 to 30 months. At the conclusion of the 30-month exposure period, all eight systems showed some coating deterioration resulting either from the driving operation or the exposure condition. The most severe damage was attributed to the action of the sea-water-sand slurry which caused moderate to heavy abrasion damage, just above the mudline, to all the systems. Based on over-all protection to the three exposure zones (splash, tidal, and embedded) together with cost considerations, a vinyl mastic coating system provided the most economical protection to the steel piling during the 30-month exposure period. (Author)

15. MATHEMATICS

AD-278 006 Div. 15, 22
(TISTP/FR) OTS price $2.60

Naval Weapons Evaluation Facility, Albuquerque, N. Mex.
CRITERIA FOR DETERMINING TESTING POLICIES,
by Gary L. Logan, Patrick L. Odell, and Wallace E. Franck. 11 Dec 61, 26p. incl. tables. (NAVWEPS rept. no. 7975)
Unclassified report

DESCRIPTORS: *Weapons, *Tests, *Reliability, Mathematical analysis.

A mathematical investigation of the effect that testing can have on the reliability of devices in terms of test reliability, probability of degradation due to testing, and number of tests performed is given. First, mathematical models are formulated on which are based the method for determining the number of tests necessary to obtain a specified level of reliability. Second, the same models are used to formulate

AD-278 372 Div. 15
(TISTP/TL) OTS price $1.10

Boeing Scientific Research Labs., Seattle, Wash.
A NOTE ON RATIONAL APPROXIMATIONS,
by E. W. Cheney. June 62, 4p. (Mathematical note no. 261; Document no. D1-82-0184)
Unclassified report

Also available from the author.

DESCRIPTORS: *Functional analysis, *Equations, *Sequences, *Numerical methods and procedures.

AD-278 392 Div. 15
(TISTP/GRW) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
THE MINIMIZATION OF BOOLEAN FUNCTIONS CONTAINING UNEQUAL AND NONLINEAR COST FUNCTIONS,
by M. A. Breuer. 22 Jan 62, 19p. incl. illus. 6 refs. (Series no. 60, Issue no. 431)
(Contract AF 49(638)1043)
(AFOSR-2445) Unclassified report

DESCRIPTORS: *Special functions, *Linear programming, Costs, Functions.

A method is presented for minimizing Boolean functions by employing linear programming. The classical model of a Boolean function in vector space is presented. From this model, the linear program for the minimization of Boolean functions in prime implicant form with arbitrary constant cost coefficients is formulated. Variable nonlinear cost functions, derived from the fan-out problem, are then considered. Methods for taking into consideration lead length, loading, and fan-in restrictions are discussed. In essence, the technique simplifies the Boolean functions to a form which is minimal in cost to implement. (Author)

AD-278 393 Div. 15
(TISTP/GRW) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
APPLICATIONS OF GRAPH THEORY TO SOLUTION OF SOME SYSTEMS OF LINEAR ALGEBRAIC EQUATIONS,
by I. Cederbaum. 23 Jan 62, 10p. incl. illus. tables, 10 refs. (Series no. 60, Issue no. 432)
(Contract AF 49(638)1043)
(AFOSR-2104) Unclassified report

DESCRIPTORS: *Matrix algebra, Algebra, Equations.

AD-278 394 Div. 15
(TISTP/GRW) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
ANALYSIS OF ERRORS IN THE ESTIMATION OF THE IMPULSIVE RESPONSE,
by H. Kwakernaak. 6 Feb 62, 33p. incl. illus. tables, 9 refs. (Series no. 60, Issue no. 434)
(Contract AF 49(638)1043)
(AFOSR-2576) Unclassified report

DESCRIPTORS: *Statistical functions, Errors, Linear systems, Least squares method, Integral equations, Noise.

The method of finding the impulsive response of a linear, time-invariant system by the computation of correlation-functions of input and output, is investigated. The effects of (1) truncation of the impulsive response, (2) sampling the data, and (3) additive noise at the output, are studied, especially under asymptotic conditions, i.e., for long observation times. Some results of a computer-study to check the theoretical results are given. (Author)

16. MEDICAL SCIENCES

AD-277 980 Div. 16
(TISTB/AW) OTS price $1.60

Bonn U. (Germany).
NATURAL TOXIC AND NARCOTIC COMPOUNDS FROM PLANTS.
Final technical rept., 1 June 61-31 May 62,
by R. Tschesche. 31 May 62, 13p.
(Contract DA 91-591-EUC-1799; Continuation of Contract DA 91-591-EUC-1493)
Unclassified report

DESCRIPTORS: *Plants, *Poisons, Toxicity, Narcotics, Chemical analysis, Alkaloids, Mice, Brazil, Argentina, South America, Chemical properties.

AD-278 022 Div. 16
(TISTB/CCH) OTS price $1.60

Rome Air Development Center, Griffiss Air Force Base, N. Y.
EFFECTS OF MICROWAVE RADIATION OF 10 AND 20 mw/sq cm (24,000 MEGACYCLES) ON THE HEMOPOIETIC SYSTEM OF THE RAT,
Technical note,
by William B. Deichmann, John Miale and Karin Landeen. May 62, 6p. tables, 4 refs. (RADC TDR 62-192)
(Proj. 5545) Unclassified report

DESCRIPTORS: *Radiation effects, *Hemopoiesis, Laboratory animals, Blood, Pathology, Leukocytes, Lymphocytes, Microwaves.

Exposure of Osborne-Mendel, CFN, and Fischer strain rats to minimal doses of microwave radiation (24,000 megacycles) induced a significant leukocytosis, lymphocytosis and neutrophilia. Effects on erythrocytes, hemoglobin and hematocrit differed in the three strains used. In Osborne-Mendel and CFN rats, all values increased; in Fischer rats, they decreased. (Author)

AD-278 064 Div. 16
(TISTB/CCH) OTS price $18.50

Brooke Army Medical Center, Fort Sam Houston, Tex.
ANNUAL RESEARCH PROGRESS REPORT, 1 JANUARY 1961 TO 31 DECEMBER 1961,
by William H. Hall and Joseph F. Powers.
30 June 62, 295p. incl. illus. tables, refs.
(Projs. 6x59-01-001 and 6x99-26-001)
Unclassified report

DESCRIPTORS: *Scientific research, *Surgery, *Burns, *Thermal radiation, Physiology, Infections, Radiation effects, Kidneys, Metabolism, Biochemistry, Antibodies, Antibiotics, Survival, Therapy, Blood, Bacteriophages, Pseudomonas, Traumatic shock, Medical research, Radiation effects.

Contents:
Traumatic surgery and shock
Radiation and thermal burns

Division 15 - MATHEMATICS

AD-278 236 Div. 15
(TISTP/MS) OTS price $4.60

North Carolina State Coll., Raleigh.
LECTURES ON FRACTIONAL INTEGRATION AND DUAL INTEGRAL EQUATIONS,
by Ian N. Sneddon. 25 June 62, 40p. incl. table, 21 refs.
(Contract Nonr-48606)
Unclassified report

DESCRIPTORS: *Integral equations, *Integration, Bessel functions, Integral transforms, Functions, Theory, Fourier analysis, Applied mathematics.

AD-278 261 Div. 15
(TISTP/MS) OTS price $4.60

RAND Corp., Santa Monica, Calif.
COMPOUND SIMPLE GAMES I: SOLUTIONS OF SUMS AND PRODUCTS,
by L. S. Shapley. June 62, 37p. incl. illus. 5 refs. (Memo. no. RM-3192-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Games theory, Mathematical analysis.

This is an investigation of the solutions of the games that are formed by combining two or more simple games, played by separate groups of individuals. A simple game is one that is completely specified by its winning coalitions. Two forms of combination are studied in detail in this Memorandum: the sum, in which a coalition wins if it wins in either component, and the product, in which a coalition wins only if it wins in both components. In both cases, relationships are established between the solutions of the compound games and those of the components. (Author)

AD-278 262 Div. 15
(TISTP/MS) OTS price $2.60

RAND Corp., Santa Monica, Calif.
ON CONTROL PROBLEMS WITH BOUNDED STATE VARIABLES,
by L. D. Berkovitz. July 62, 20p. incl. 6 refs.
(Memo. no. RM-3207-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Programming, *Calculus of variations, Differential equations, Vector analysis, Functions, Mathematical analysis, Control.

Control problems are studied in which constraints that are independent of the control are imposed on the state variables. Necessary conditions that hold along an optimal trajectory are derived in a relatively simple fashion from known results in the calculus of variations. These results had been obtained by Gambrelidze in a different fashion. (Author)

AD-278 263 Div. 15, 2
(TISTP/AW) OTS price $1.60

RAND Corp., Santa Monica, Calif.
UNIQUENESS PROBLEMS IN THE MATHEMATICS OF MULTIPLE SCATTERING,
by T. W. Mullikin. June 62, 9p. incl. 13 refs.
(Memo. no. RM-3221-PR)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: *Cosmic rays, *Scattering, *Atmosphere, Intensity, Electromagnetic wave reflections, Transmission, Polynomials, Nonlinear differential equations, Differential equations, Equations, Theory, Functions, Integral equations, Series, Mathematical analysis.

Some recent mathematical studies concerning the uniqueness of solutions to Chandrasekhar's mathematical formulation of principles of invariance in the theory of radiative transfer are reported. It is shown that the X and Y equations and the psi and phi equations of Chandrasekhar have a multiplicity of solutions for many phase functions describing local scattering, the extent of the nonuniqueness having been only partially explored by Chandrasekhar. The present results should be of interest and concern to those attempting to solve these equations by numerical iteration. (Author)

AD-278 275 Div. 15
(TISTP/AW) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
UPPER AND LOWER BOUNDS FOR THE APSIDAL ANGLE IN THE THEORY OF THE SPHERICAL PENDULUM,
by J. B. Diaz and F. T. Metcalf. June 62, 21p. illus. 17 refs. (NOLTR 62-55)
Unclassified report

DESCRIPTORS: *Rhythm, *Mechanics, Spheres, Bodies of revolution, Theory, Motion, Differential equations, Integration.

A simple method is developed for obtaining upper and lower bounds for the apsidal angle which occurs in the theory of the spherical pendulum. This method is employed to give a quick derivation of the well-known lower and upper bounds of Puiseux and Halphen (respectively) for the apsidal angle. The same method also yields readily the extension of Puiseux's lower bound discovered by W. Kohn. An advantage of the present method is the simplification which arises from eliminating the need for contour integration. The sharpness of the bounds is also demonstrated. (Author)

AD-278 358 Div. 15, 30
(TISTP/FR) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
RANDOM VARIABLES AND COMPUTERS,
by George Marsaglia. May 62, 21p. incl. illus. 12 refs. (Mathematical note no. 260; Document no. D1-82-0182)
Unclassified report

Also available from the author.

DESCRIPTORS: *Statistical distributions, *Sequences, Digital computers.

Methods for generating, in a digital computer, sequences of numbers which will serve as realizations of a sequence of random variables are described. The problem has two parts - the problem of producing independent uniform random variables, and the problem of producing arbitrary random variables in terms of uniform random variables. Section I describes arithmetic procedures for generating uniform variables. It contains nothing new. Section 2 considers properties of linear transformations, modulo 1, of uniform variables. These are the theoretical analogues of the arithmetic procedures for generating uniform variables. The rest of the paper is devoted to the problem of producing arbitrary random variables in terms of uniform random variables. (Author)

obtained include both the physical and biochemical characteristics of the blood, using semi-microtechniques and ultramicrotechniques. The resulting normal populations then act as a guide for quality control of laboratory colonies.

AD-278 369 Div. 16
(TISTB/MS) OTS price $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
A REVIEW OF STUDIES ON THE EXTRACTIVES OF THE PLANT, RYANIA SPECIOSA,
by David L. Hill and Edmund F. Murtha. May 62, 22p. incl. tables, 59 refs. (CRDL Special pub. no. 2-47)

Unclassified report

DESCRIPTORS: *Plants, *Ryanodine, Biochemistry, Physiology, Toxicity, Pharmacology, Paralysis, Inhibition, Muscles, Enzymes, Cardiac muscle.

This report is a review of all known studies on the subject, including those of natural products and of chemical, physiological, pharmacological, and biochemical natures. (Author)

17. METALLURGY

AD-278 043 Div. 17
(TISTM/EJH) OTS price $1.60

Southern Research Inst., Birmingham, Ala.
AN INVESTIGATION OF THE CRACK-PROPAGATION RESISTANCE OF HIGH-STRENGTH ALLOYS AND HEAT-RESISTANT ALLOYS.
Bimonthly progress rept. no. 9, 23 Apr-23 June 62,
by W. R. Salzman and J. D. Morrison. 10 July 62, 12p. incl. illus. tables, 3 refs. (Rept. no. 5397-1256-9)
(Contract NOw 61-0392-d)

Unclassified report

DESCRIPTORS: *Niobium alloys, *Heat resistant alloys, Alloys, Sheets, Refractory materials, Zirconium alloys, Tensile properties, Fatigue (Mechanics), Failure (Mechanics), Mechanical properties, Elasticity, High temperature research, Low temperature research, Fracture (Mechanics).

The tensile properties and crack-propagation properties of 0.050 in.-thick D-14 Nb-alloy sheet were determined over the temperature range from -300 F to 1200 F. No brittle-ductile transition was found at temperatures down to -300 F. Very slight evidence of strain aging manifested by increased strength properties and serrated plastic stress-strain curves, was noted at two elevated temperatures 600 F and 1100 F. (Author)

AD-278 051 Div. 17, 25
(TISTM/EJH) OTS price $1.60

Pennsylvania U. School of Metallurgical Engineering, Philadelphia.
LOW TEMPERATURE TENSILE PROPERTIES OF ZONE-REFINED NIOBIUM (COLUMBIUM).
Master's thesis,
by J. F. Wellings and R. Maddin. 1962, 9p. illus. tables, 25 refs.
(Contract Nonr-55119)

Unclassified report

DESCRIPTORS: *Niobium, *Zone melting, *Deformation, Stresses, Impurities, Low temperature research, Plastic flow, Crystals, Single crystals, Lattices, Resistance, Electrical properties, Spectrographic analysis, Temperature, Tensile properties, Mechanical properties.

Specimens of electron beam zone-refined Nb were subjected to tensile tests in the temperature range from 373 to 4.2 K. Both polycrystalline and single crystalline specimens were tested. Specimens were either deformed to fracture or the temperature was changed during deformation to measure the reversible flow stress. The quantity of impurities remaining in the zone-refined material was ascertained by chemical analyses and the results were checked by resistivity measurements. A significant amount of zone-refining took place even at the relatively high rates of zone travel used (2mm/min.). Twinning was observed in all specimens tested at 4.2 K. No discontinuous yield points were observed in these tests indicating that this phenomenon is dependent upon impurity content. An increased impurity level resulted in a lowering of the yield and flow stresses without an appreciable change in the temperature dependence. This indicates that a lattice frictional stress is the possible mechanism responsible for the temperature dependence of the yield and flow stresses. (Author)

AD-278 068 Div. 17, 25
(TISTM/EJH) OTS price $3.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
NUCLEATION AND GROWTH IN DEPOSITION OF METALS FROM VAPOR AND OXIDATION OF ALLOYS. PART I. THE THERMODYNAMIC PROPERTIES OF SOLID GOLD-NICKEL ALLOYS AT 775-935 C. PART II.
Final rept.,
by R. D. Gretz, G. M. Pound and others.
30 June 62, 25p. incl. illus. tables, refs.
(Contract AF 18(600)1572)

Unclassified report

DESCRIPTORS: *Vapor plating, *Nucleation, *Silver, *Tungsten, *Gold alloys, *Nickel alloys, Adsorption, Silver plating, Crystals, Solids, Solutions, Mixtures, Enthalpy, Entropy, Metallic smoke deposits, Field emission, Phase studies, Metals, Alloys, Thermodynamics.

Nucleation and growth in deposition of metals from vapor and oxidation of alloys: Measurement of the concentration of adsorbed Ag required for nucleation of Ag crystals to occur on a W substrate were made. The apparent critical concentration of adsorbate required to produce nucleation decreases with increasing impingent flux. The true critical concentration required to produce nucleation is the same for all fluxes and is 1.5 x 10 to the 14th power atoms/sq cm sec. Thermodynamic properties of solid Au-Ni alloys: Emf measurements were made on 10 Au-Ni alloys at temperatures of 775, 825, 900 and 935 C. The derived activities of both Ni and Au showed large positive deviations from Raoult's law. The enthalpies of mixing are positive, and both the free energy and entropy of mixing are positively in excess of ideal values at all compositions. Tabulations of the activities; free energies, entropies and enthalpies of mixing are given.

AD-278 122 Div. 17, 26
(TISTM/EJH) OTS price $8.60

Armour Research Foundation, Chicago, Ill.
IMPROVEMENT OF QUALITY OF ARC WELDS IN ALUMINUM ALLOYS BY APPLICATION OF SONIC VIBRATIONS OR ELECTROMAGNETIC STIRRING.
Final rept., 12 May 60-12 Aug 61,
by David C. Brown, John F. Rudy and others.
12 Aug 61, 85p. incl. illus. tables, 17 refs.
(Rept. no. ARF 2202-14)
(Contract DA 11-022-ORD-3408)

Unclassified report

Division 16 - MEDICAL SCIENCES

Riboflavin metabolism in burned rats -
C. J. Koehn
Metabolic studies of pseudomonas infection -
K. F. LaNoue, A. D. Mason, Jr., and
H. L. Walker
A rapid calcium infusion test for hyperparathyroidism - R. S. Goldsmith, A. D. Mason, Jr., W. H. Hall, and J. F. Powers

AD-278 079 Div. 16
(TISTB/AW) OTS price $5.60

California U., Berkeley. Coll. of Engineering and School of Public Health.
MICROBIOLOGICAL WASTE CONVERSION IN CONTROL OF ISOLATED ENVIRONMENTS.
Annual rept. no. 2,
by W. J. Oswald, C. G. Golueke and others.
28 Feb 62, 46p. incl. illus. tables, 7 refs.
(Contract AF 19(604)6637, Proj. 6694)
(AFCRL 62-602) Unclassified report

DESCRIPTORS: *Closed-cycle ecological systems, *Algae, Metabolic products, Disposal, Nitrogen, Oxygen, Laboratory equipment, Waste gases, Mice, Toxicity, Growth, Nutrition, Feasibility studies, Carbon dioxide, Culture media.

Results of studies involving variations in the rate of gas flow through an algal culture showed that doubling the rate of flow resulted in a 45 percentage increase in the over-all visible light energy conversion efficiency of the culture. Experiments with the modified unit showed that the ecological system can be maintained in a balanced state for periods in excess of six weeks. Further experimentation with the system showed that it possesses essentially homeostatic properties. A determination of the dynamics of the system indicates that the dynamic part of the transfer function with respect to light input can be mathematically described. Studies on the nutritional characteristics of the algal-bacterial culture in the microterella indicate that nitrogen is the only nutrient not supplied in sufficient amount by the mouse's wastes. Sustained recycling of the culture liquid failed to demonstrate a build-up of toxic material. (Author)

AD-278 083 Div. 16
(TISTP/FR) OTS price $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
MAN AND RADIATION,
by Rudolf Schulze, tr. by Alex Palinkas. May 62, 20p. incl. illus. (Technical notes no. FRL-TN-90; Trans. from Lichttechnik 12:443-448, 1960)
Unclassified report

DESCRIPTORS: *Man, *Radiation effects, Ultraviolet radiation, Infrared radiation, Cosmic rays, Light, Natural radioactivity.

Material radiation, cosmic radiation, gamma radiation, and x-ray radiation (which can ionize and thereby damage the cell albumin) appear in nature at such a low and constant rate that almost no biological effects are to be expected. The same is true for natural radioactivity. The newly added artificial radiation can, because of its concentration, become dangerous to the human organism. Natural ultraviolet radiation and visible light can reach man through the atmosphere practically without obstruction. Their intensity of radiation is high and fluctuating: with their biological effect very high, they can activate vitamins and enzymes, and they can influence our psyche favorably.

AD-278 137 Div. 16
(TISTB/MS) OTS price $1.60

Army Medical Research Unit (Europe).
BIOLOGICAL AND MEDICAL ASPECTS OF IONIZING RADIATION.
Annual progress rept., 1 July 61-30 June 62,
by Charles O. Onstead, Jon W. Blumenstock and Erich Oberhausen. 30 June 62, 15p. incl. illus. tables.
Unclassified report

DESCRIPTORS: *Body, *Radiobiology, *Radioactivity, *Radiation counters, Instrumentation, Cesium, Potassium, Cancer, Cancer research, Radiation effects, Measurement.

The capabilities of the unit have been augmented by adding an 8x5 inch NaI (Th) crystal to our two pi liquid scintillation whole body counter. The changing cesium-137 concentrations and the potassium findings in the general population are presented. Clinical investigations have shown the value of the whole body counter in conducting follow-up studies of patients treated for carcinoma of the thyroid. Other work is performed on a cooperative basis with the Medical Faculty of the University of the Saar. The fission products found in the rainfall have been measured at weekly intervals since September 1961. Milk samples obtained from various European areas show a recent marked increase in cesium-137 concentration. (Author)

AD-278 172 Div. 16
(TISTB/MS) OTS price $6.60

Bell Telephone Labs., Inc., Whippany, N. J.
THE EFFECTS OF RADAR ON THE HUMAN BODY (RESULTS OF RUSSIAN STUDIES ON THE SUBJECT),
by John J. Turner. 1961, 64p. incl. tables.
Unclassified report

DESCRIPTORS: *Radar, *USSR, *Microwaves, Physiology, Metabolism, Pathology, Body, Medical research, Radiation effects.

Over a period of several years, the Academy of Medical Sciences, U.S.S.R. conducted clinical observations of the health of 525 persons who had been exposed to microwave radiation of various intensities and durations. The results of these examinations prompted the establishment of the Russian permissible limit for exposure to microwave radiation of 0.01 milliwatts per square centimeter for exposure during an entire working day. The clinical data obtained from the examinations is listed and discussed. (Author)

AD-278 368 Div. 16
(TISTB/CCH) OTS price $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
COMPENDIUM OF NORMAL BLOOD VALUES FOR LABORATORY ANIMALS WITH INDICATIONS OF VARIATIONS. PART I. RANDOM-SEXED POPULATIONS OF SMALLER LABORATORY ANIMALS,
by Kenneth F. Burns and C. W. de Lannoy. Apr 62, 22p. incl. tables, 20 refs. (CRDL Special Pub. no. 4-36)
Unclassified report

DESCRIPTORS: *Hematology, *Blood chemistry, *Laboratory animals, Physical properties, Electron microscopes, Histological sections, Statistical analysis, Biochemical tests.

The object of this study is to establish standard baseline hematological values of the smaller random-sexed laboratory animals: rats, mice, guinea pigs, rabbits, and hamsters. The values

DESCRIPTORS: *Single crystals, *Aluminum, Growth, X-ray diffraction analysis, Laboratory furnaces, Deformation, Heat treatment.

A simple gradient heating apparatus was developed and used successfully in growing oriented single crystals of high-purity aluminum suitable for X-ray diffraction analysis. (Author)

AD-278 259 Div. 17
(TISTM/SEB) OTS price $3.50

Republic Aviation Corp., Farmingdale, N. Y.
DETERMINATION OF CAUSES OF CRACKING IN WELDING AGE HARDENABLE HIGH TEMPERATURE ALLOYS.
Final rept., 1 Nov 60-1 Nov 61,
by B. S. Blum. Apr 62, 228p. incl. illus. tables, 121 refs.
(Contract AF 33(616)7670, Proj. 7351)
(ASD TR 61-678) Unclassified report

DESCRIPTORS: *Welds, *Alloys, *Stainless steel, Fracture (Mechanics), Metallurgical analysis, Tensile properties, Metallic crystals, Microstructure, Physical properties, Aluminum alloys, Titanium alloys, Molybdenum alloys, Nickel alloys, Chromium alloys, Manganese alloys, Copper alloys, Mechanical properties, Stresses.

Tensile, hot ductility, metallographic and weldability studies were conducted to determine the cause of base metal cracking in A-286 weldments. A mechanism for cracking was proposed, based on grain size, interstice formation by grain boundary sliding or Fe2Ti-Fe liquation, embrittlement by Ni3(Al, Ti) general and TiC grain boundary precipitation on insufficiently rapid cooling. The effect of stress on weld metal cracking was studied with variable restraint specimens, and optimum filler wires were evaluated on segmented finger specimens. The strain-age cracking study conducted on Rene' 41 and Inconel X concentrated on the non-equilibrium time between the annealed condition and the aged condition in the 1050 to 1500 F temperature range. Tensile and dilatometric studies indicated a possible transient embrittlement on initial heating. The time, temperature and prior material history dependence of the aging contraction was studied, and based on these results, and metallographic analysis of Inconel X, a mechanism to account for strain-age cracking was developed. The difficulties encountered in developing a valid strain-age cracking specimen are discussed. (Author)

AD-278 354 Div. 17, 26
(TISTM/EJH) OTS price $.75

Naval Ordnance Test Station, China Lake, Calif.
METALLURGICAL PROPERTIES OF SOME EXPLOSIVELY WELDED METALS,
by George A. Hayes and John Pearson. June 62, 28p. incl. illus. tables, 9 refs. (NOTS TP 2950)
(NAVWEPS rept. no. 7925)
Unclassified report

DESCRIPTORS: *Welds, *Welding, *Aluminum, *Brass, *Steel, *Tantalum, Mechanical properties, Physical properties, Hardening, Phase transitions, Alloys, Microstructure, Crystallization, Hardness, Explosives.

Studies of the explosive welding of aluminum, brass, copper, steel, and tantalum in various combinations of single and multiple welds are described. Work-hardening data and a microstructural analysis indicating the metallurgical properties for explosive welds of similar and dissimilar metal combinations are presented. (Author)

AD-278 355 Div. 17
(TISTM/EJH) OTS price $3.60

Belfour Engineering Co., Suttons Bay, Mich.
FATIGUE OF METALS. ALUMINUM. SECTION II.
Rept. on Mechanical Properties Information Processing Systems.
May 62, 28p. incl. illus. tables, 9 refs.
(Contract AF 33(616)7238, Proj. 7381)
(ASD TN 61-117, pt. 4)
Unclassified report

DESCRIPTORS: *Aluminum, *Aluminum alloys, *Fatigue (Mechanics), Tensile properties, Mechanical properties, Data, Alloys, Metals, Sheets, Metal plates, Rods, Forging, Extrusion.

The graphs presented display metals fatigue information from various sources of published and unpublished test reports which have been processed and regenerated through a semi-automatic data processing system. Each series or set of graphs contains descriptive information (legends) which identifies the material, test procedure, test conditions and the most significant test and/or material variables associated with the plotted data. The data displayed in each set of graphs is intended to answer very general questions and to serve as a guide to further investigation of specific areas within the subject presented. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-278 379 Div. 18
(TISTE/CAM) OTS price $5.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
STRUCTURAL ESTIMATION IN LOGISTICS RESOURCE ALLOCATION MODELS,
by Wade Sewell. 14 May 62, 49p. (Rept. no. VM-1551-G-1)
(Contract Nonr-345900)
Unclassified report

DESCRIPTORS: *Submarines, *Naval logistics, Supplies, Costs, Scheduling, Theory, Personnel, Selection, Maintenance, Logistics, Probability, Sampling, Equations, Mathematical analysis, Model tests, Statistical analysis, Guided missiles (Underwater to surface), Simulation.

Two models in the context of the Polaris support system are presented. One is designed to capture some of the important possibilities for substitution among personnel of different skill specialties and spare parts of various kinds in the self-support logistics activities of a submarine on patrol. The other is concerned with the service of submarines by tenders. It is intended to deal with such problems as the choice of personnel and parts to be made available at the tender, the amount of maintenance to be performed at the tender and the determination of shortage penalties to be used with associated inventory models. Together with some generalizations that are indicated, this model is also relevant to the analysis of questions regarding the scheduling of submarines to tenders and the number of submarines to be assigned to a tender. Two points regarding the application of models of this kind should also be recorded here. The first is that it cannot be anticipated that they will prove accurate in all significant details or focus in every case on the most relevant problems. The second is that the data recorded in operations are often not adequate for the requirements of such models so that special data-collection efforts may be necessary. (Author)

Division 17 - METALLURGY

DESCRIPTORS: *Arc welds, *Aluminum alloys, Welds, Arc welding, Vibration, Electromagnetic waves, Magnetic fields, Microstructure, Grains (Metallurgy), Porosity, Acoustics, Vibrators, Quality control.

An investigation of the effects of electromagnetic stirring and sonic vibration on weld microstructures, porosity, physical properties, and weld shape has been made using 5183 aluminum filler alloy (aluminum - 4 1/2% magnesium alloy). Grain refinement and elimination of the characteristic dendritic weld metal solidification pattern was the principal effect found. The results show no beneficial effect on properties, and no degassing tendency. The degree of grain refinement obtained with electromagnetic stirring and impact vibration was compared to that obtainable with heterogeneous inoculation. The latter method of grain refinement is the most effective although, again, no beneficial effect on properties was determined. A Viscous Shear Theory is offered to account for the grain refinement obtained with stirring and vibration. (Author)

AD-278 171 Div. 17, 1
(TISTA/GEC) OTS price $1.00

Aeronautical Research Inst. of Sweden.
INSPECTION PERIODS DETERMINED FROM DATA OF CRACK DEVELOPMENT AND STRENGTH REDUCTION OF AN AIRCRAFT STRUCTURE USING STATIC ANALYSIS.
Rept. for June 60-June 61, on Structural Design Criteria,
by Sigge Eggwertz. May 62, 26p. incl. illus. 23 refs.
(Contract AF 61(052)431, Proj. 1367)
(ASD TDR 62-391) Unclassified report

Presented at the ICAF-AGARD Fatigue Symposium, May 16-18, 1961, in Paris.

DESCRIPTORS: *Fracture (Mechanics), *Airframes, *Failure (Mechanics), *Aviation safety, Structures, Aircraft, Statistical analysis, Stresses, Detection, Fatigue (Mechanics), Probability.

Regular inspections of an aircraft structure might form a very effective means of providing an adequate safety level when the inspection periods are determined by statistical analysis. If it is assumed that a crack of a certain minimum length, is always detected at the inspections, it is possible to calculate the probability of collapse of the structure for any inspection period and limit life of the structure, provided the load spectrum, the time to critical-crack initiation, as well as the crack propagation and the corresponding reduction of the ultimate strength, are known from experimental investigations. Numerical evaluations have been made, assuming various stress levels and inspection periods. The appropriate inspection periods were determined and compared with the crack propagation time to final failure. The approximations introduced in the statistical analysis, are discussed, and suggestions are made for future theoretical and experimental investigations. (Author)

AD-278 194 Div. 17
(TISTM/JSM) OTS price $.75

Defense Metals Information Center, Columbus, Ohio.
THE EFFECTS OF DECARBURIZATION ON THE PROPERTIES OF ULTRAHIGH-STRENGTH STEELS,
by W. R. Warke and A. R. Elsea. 18 June 62, 21p. incl. illus. tables, 12 refs. (DMIC memo. no. 154)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Steel, *Carbon, *Oxidation, Fracture (Mechanics), Fatigue (Mechanics), Heat treatment, Reduction, Salts, Liquids, Coatings, Controlled atmospheres, Hardness, Mechanical properties.

From the available data it appears that a partially decarburized skin on high-strength steel parts increases the fracture strength but seriously lowers the resistance to fatigue. Decarburization can be controlled by the use of various heat-treating media such as molten-salt baths, protective coatings, and inert or controlled atmospheres. The most generally used medium for heat-treatable steels is the endothermic atmosphere. By control of the dew point, this atmosphere can be varied from strongly oxidizing (decarburizing) to strongly reducing (carburizing). There is no accurate nondestructive method for measuring the degree or depth of surface decarburization on steel parts. The most reliable method involves microhardness traverses of metallographic sections cut from fully hardened parts. (Author)

AD-278 230 Div. 17, 25
(TISTM/EJH) OTS price $4.60

Sheffield U. (Gt. Brit.).
IMPURITIES AND IMPERFECTIONS IN METALS AND SEMICONDUCTORS.
Final technical rept. no. 4, 1 June 61-31 May 62,
by N. H. March and A. D. Boardman. 31 May 62, 48p. incl. illus. table, 14 refs.
(Contract DA 91-591-EUC-1772)
Unclassified report

DESCRIPTORS: *Metals, *Semiconductors, *Metallic crystals, *Perturbation theory, Impurities, Gas ionization, Gas diffusion, Electrons, Gases, Density, Theory, Integral equations, Alloys, Intermetallic compounds, Copper, Solid state physics.

Contents: Self-consistent perturbation treatment of impurities and imperfections in metals: Second-order perturbation corrections; Self-consistent equation to second-order in the perturbing potential; Discussion of angular integrations; Screened potentials and densities; and Residual resistance in alloys. Density of states in second-order treatment: Formula for density of states; Connection with Houghton's work; and Specific heat of dilute alloys. Further results on perturbations in an electron gas at non-zero temperatures: Condition for validity of Brooks-Herring treatment; and Final results on low temperature case. Scattering of Bloch waves by localized perturbations: Perturbed wave functions; First order calculation; Calculation of average wave function product; and Asymptotic form of localized potential.

AD-278 250 Div. 17
(TISTM/BRW) OTS price $.50

Watertown Arsenal Labs., Mass.
ORIENTED SINGLE CRYSTALS OF ALUMINUM FOR X-RAY ANALYSIS,
by Joseph M. Dhosi, Charles P. Gazzara, and Raymond M. Middleton. June 62, 9p. incl. illus. 4 refs. (Technical rept. WAL TR 129.1/1)
(Proj. 59901004)
Unclassified report

by J. M. Chapman. 29 June 62, 38p. incl. illus. tables, 8 refs. (Technical note no. N-443)
Unclassified report

DESCRIPTORS: *Ducts, *Gamma rays, Scattering, Gamma ray spectroscopy, Dosimeters.

Dosimeter measurements and gamma-ray spectra were taken in a 3-foot square concrete duct. The spectra are used to determine the dose rate contributions from the individual scattering areas and to determine the percentage of these dose rate contributions due to multiple scattering in the first leg. Dose rates are compared with calculated values, and it is found that calculated values are always low. This discrepancy is attributed to the effects of multiple scattering. (Author)

AD-278 240 Div. 20
(TISTP/FR) OTS price $1.60

Nobel Inst. for Physics (Sweden).
INVESTIGATION OF NUCLEAR REACTIONS INDUCED BY HEAVY ION BOMBARDMENT AND OF EXCITED LEVELS IN HEAVY NUCLEI.
Technical rept.,
by Ingmar Bergstrom and Bjorn Astrom. 15 June 62, 19p. incl. illus. 18 refs.
(Contract AF 61(052)118)
(AFOSR-2975) Unclassified report

DESCRIPTORS: *Ions, *Alpha particles, *Ion bombardment, Radioactive decay, Radioactive isotopes, Protons, Scattering, Materials, Astatine, Oscilloscopes.

The following work is reported: (1) Angular correlations in (alpha,p)- and (alpha,alpha')-reactions at 14 MeV. (2) Heavy ion induced reactions and properties of light astatine isotopes formed in those reactions. (3) Study of energy levels, transition probabilities, etc. in several isotopes mostly in the lead region, excited in radioactive decay. (4) Stopping of heavy ions in various materials. (5) New instruments and methods: (a) automatic gain controlled amplifier, (b) use of CRT oscilloscopes in time- and pulse-height measurements, (c) time to pulse-height converter, (d) surface barrier semiconductor detectors. (Author)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-277 956 Div. 22
(TISTW/RD) OTS price $3.60

Army Arctic Test Board, Fort Greely, Alaska.
SERVICE TEST OF MORTAR, INFANTRY, SELF-PROPELLED, 4.2-INCH, XM106.
7 June 62, 38p. incl. illus. tables (Proj. ATB 3-142)
Unclassified report

DESCRIPTORS: *Mortars, *Self-propelled guns, Arctic regions, Tests, Armored vehicles, Tracked vehicles.

Tests were conducted (1) to determine if the infantry, self-propelled, 4.2-inch, XM106 mortar, is suitable for Army use under arctic winter conditions, and (2) to determine the effect of the increased weight of the mortar on the mobility of the vehicle in arctic terrain. It was concluded that: (a) the mortar should be suitable for such Army use when the deficiencies are corrected, and (b) the increased weight of the mortar had no significant effect on the mobility of the vehicle in arctic terrain.

AD-277 973 Div. 22
(TISTW/RD) OTS price $2.60

North Carolina State Coll., Raleigh.
STUDY OF THE GUN-BOOSTED ROCKET SYSTEM.
Monthly progress rept. no. 4, 1-31 May 62, by R. C. Bullock. May 62, 23p. incl. tables, 6 refs.
(Contract DA 01-009-ORD-1022, Proj. 5W17-01-002)
Unclassified report

DESCRIPTORS: *Rockets, *Rocket launchers, Rocket trajectories, Fin stabilized ammunition, Spin stabilized ammunition, Artillery rockets, Exterior ballistics, Velocity, Spin, Gun launched.

A discussion is presented of rocket accuracy for a specific group of gun-boosted spin-stabilized rounds for which typical data are given. The background for the formulas displayed, along with the formulas themselves, appears in the summary report which is in preparation. (Author)

AD-278 054 Div. 22
(TISTW/EET) OTS price $3.60

Aircraft Armaments, Inc., Cockeysville, Md.
XM34, XM35, AND XM47 MINIATURE INITIATORS.
June 62, 35p. incl. illus. tables (Rept. no. ER-2749)
(Contract DA 36-034-ORD-3391)
Unclassified report

DESCRIPTORS: *Detonators, *Primers, Electric detonators, Electric primers, Miniature electrical equipment, Production, Test methods, Design, Tests, Temperature, Vibration, Humidity, Sand, Particles, Chromium plating, Miniature electronic equipment.

This report includes:
Wyle-Burgoyne Div., Wyle Labs., Inc., Westbury, N. Y.
ENVIRONMENTAL TEST ON AIRCRAFT ARMAMENTS, INC., TWO XM34 EXACTORS, TWO XM35 EXACTORS AND FIFTEEN CARTRIDGES. 6 Dec 61 (Rept. no. 1433)

A summary of work performed in the fabrication of XM34 and XM35 Miniature Initiators is presented. The necessary components were fabricated for the engineering test firings. All tests were completed satisfactorily. Six each of the XM34's and XM35's were sectioned, chromium plated, mounted for display and delivered to Frankford Arsenal. (Author)

AD-278 084 Div. 22
(TISTP/FR) OTS price $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
ON THE EXPANSION OF SHOCK WAVES AROUND A DETONAT-

Division 19 - NAVIGATION
Division 20 - NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

19. NAVIGATION

AD-278 082 Div. 19, 8, 6
(TISTA/VGW) OTS price $9.60

Martin-Marietta Corp., Orlando, Fla.
ENGINEERING DESIGN INVESTIGATION OF FAA CENTER-TO-TOWER RADAR HAND-OFF DATA LINK AND PPI ADAPTATION EQUIPMENT.
Apr 62, 111p. incl. illus. tables, 31 refs.
(Rept. no. OR-1835)
(Contract FAA/ARDS-441)
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Data transmission systems, *Radar scanning, *Plan position indicators, Feasibility studies, Design, Airport control towers, Display systems, Television display systems, Cathode ray tubes, Analog systems, Digital systems, Electronic equipment, Radar equipment.

The results are outlined of a design investigation which covered the following major areas: (1) the definition of the most feasible methods and the equipment required to transfer radar hand-off data between air route traffic control centers and airport control towers; and (2) the definition of the most feasible methods and the equipment required for adapting the radar hand-off equipment for presentation of data on various types of existing PPI radar displays. This report includes an outline of the design approach used in conducting the design study, a brief description of the radar scan-converter TV marker hand-off equipment with which the data link and PPI adaption equipment must be compatible, an analysis of certain performance requirements which define the required design parameters of the equipment, a discussion of the characteristics of the data link and display systems considered, an evaluation of these techniques from the standpoint of their suitability in meeting the subject requirements, a detailed description of the recommended radar hand-off data link and PPI adaptation equipment, and an analysis of the overall accuracy of the recommended Radar Hand-off System. The digital printed circuit cards recommended for implementing major portions of the radar hand-off system are described. (Author)

AD-278 216 Div. 19, 33
(TISTA/VGW) OTS price $2.60

Coordinated Science Lab., U. of Illinois, Urbana.
OPTIMUM LANDING ORDER OF PLANES,
by Henry Bobotek. June 62, 23p. incl. illus.
(Rept. no. R-142)
(Contract DA 36-039-sc-85122)
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Airports, Landing, Time, Mathematical analysis, Mathematical logic, Digital computers, Scheduling.

The report considers optimization of landing order with respect to runway acceptance rate and total delay for planes desiring to land at the same one-runway airport. Two cases determined by the character of the minimum landing separation are recognized: (a) constant landing separation time and (b) variable landing separation time. For constant separation time, it is shown that the first-come-first-served landing order both maximizes the runway acceptance rate and minimizes the total delay. For variable separation time, a class of permutations allowing maximum runway acceptance rate is defined and rules for selecting a permutation yielding minimum total delay are given. (Author)

AD-278 218 Div. 19, 8
(TISTW/DLW) OTS price $5.60

ITT Federal Labs., Nutley, N. J.
TACAN SOLID STATE ELECTRONIC KEYER.
Final engineering rept. no. 1.
15 Mar 62, 25p. incl. illus.
(Contract AF 19(604)8811)
(AFCRL 62-326) Unclassified report

DESCRIPTORS: *Radio navigation, *Pulse generators, *Radio signals, Radio equipment, Radio beacons, Electronic circuits, Trigger circuits, Timing circuits, Identification systems, Design, Reliability, Solid state physics, Tests, Modulators, Coding.

Research is concerned with the design, construction, and testing of a solid-state electronic identification keyer for existing and future Tacan and similar navigational aid equipments to replace mechanical keyers now in use. The function of the Tacan keyer is to produce a beacon identification, consisting of four Morse-coded characters, transmitted once every thirty seconds. The keyer developed is compatible with existing and new equipments and has definite advantages in reliability, coded-output setup procedure, flexibility with respect to application in future equipments and potential size reduction. Maintenance is reduced considerably, since periodic servicing and adjustment is nonexistent. (Author)

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-278 046 Div. 20
(TISTP/FR) OTS price $1.75

Battelle Memorial Inst., Columbus, Ohio.
THEORETICAL AND EXPERIMENTAL STUDIES CONCERNING RADIATION DAMAGE IN SELECTED COMPOUND SEMICONDUCTORS.
Final technical rept. on Research in General Physics,
by Lee W. Aukerman, Eugene M. Baroody and others.
May 62, 56p. incl. illus. table, 42 refs.
(Contracts AF 33(616)3747 and AF 33(616)8064, Proj. 7112)
(ARL 62-343) Unclassified report

DESCRIPTORS: *Semiconductors, *Radiation damage, Fast neutrons, Electrons, Diodes, Germanium, Silicon, Gallium compounds, Arsenides, Cadmium compounds, Tellurides, Sulfides.

The effects of energetic particles on the electrical and optical properties of various semiconducting compounds have been investigated. Emphasis has been placed on n-type GaAs irradiated with fast neutrons and 1-Mev electrons. The effects of fast-neutron irradiation on the performance of Ge, Si, and GaAs Esaki diodes have also been observed and analyzed. (Author)

AD-278 119 Div. 20
(TISTP/FR) OTS price $3.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
GAMMA DOSE RATES AND ENERGY SPECTRA IN A 3-FOOT SQUARE DUCT,

Two packaging systems for 7.62mm ammunition in five round clips were developed and tested. One system consisted of each clip in a heat sealed envelope, two envelopes per pocket of a six pocket cloth bandoleer, and the other system consisted of two clips in a chipboard point protector per pocket of a six pocket cloth bandoleer. Both systems could be overpacked in the M2A1 and T47 ammunition boxes. Engineering and user tests indicated that the heat sealed envelope system was not required and that the most suitable packaging system for 7.62mm ammunition in five round clips was two clips in a chipboard point protector per pocket of the T5 Bandoleer, 14 bandoleers per T47 ammunition box. The use of an all plastic bandoleer for packaging clipped 7.62mm ammunition was also investigated. (Author)

AD-278 384 Div. 22, 30
(TISTW/PCR) OTS price $10.50

Denver Research Inst., Colo.
RESEARCH AND DEVELOPMENT LEADING TO PERFECTION OF INSTRUMENTATION OF ELECTRO-EXPLOSIVE DEVICES. VOLUME I. VACUUM DEPOSITED THERMOCOUPLE DEVELOPMENT AND INSTRUMENTED ELECTRO-EXPLOSIVE DEVICE CHARACTERISTICS.
Final rept., 27 Dec 60-31 Mar 62,
by D. B. Barker, R. K. Fry and others. 31 Mar 62, 134p. incl. illus. tables, refs. (Rept. no. DRI 2033, vol. 1)
(Contract N178-7818)
Unclassified report

DESCRIPTORS: *Electric detonators, *Thermocouples, Vacuum apparatus, Tellurides, Tin, Bismuth, Lead compounds, Theory, Manufacturing methods, Thin films, Thermoelectricity, Bridges, Wire, Vacuum systems.

Contents:
Vacuum-deposited film properties
Fabrication of vacuum-deposited thermocouples
Vacuum deposited Bi-Te thermocouple tests
Material selection for optimizing thermocouple properties
Squib ignition element measurements
Thermocouple instrumented squibs
Theoretical analysis of heat transfer in thermocouples

AD-278 385 Div. 22, 30
(TISTW/DLW) OTS price $8.60

Denver Research Inst., Colo.
RESEARCH AND DEVELOPMENT LEADING TO PERFECTION OF INSTRUMENTATION OF ELECTRO-EXPLOSIVE DEVICES. VOLUME II. RADIO FREQUENCY TESTING AND MISCELLANEOUS METHODS OF INSTRUMENTATION.
Final rept., 27 Dec 60-31 Mar 62,
by D. B. Barker, R. K. Fry and others. 31 Mar 62, 89p. incl. illus. tables, refs. (Rept. no. DRI 2033, vol. 2)
(Contract N178-7818)
Unclassified report

DESCRIPTORS: *Electric detonators, *Electric igniters, *Electromagnetic fields, *Test facilities, Instrumentation, Impedance, Microwaves, Electric bridges, Radiofrequency, Thermocouples, Absorption, Hall effect Detectors, Infrared photoconductors, Measurement, Test methods, Hazards.

Data from impedance measurements on the Mk 1 squib and Mk 2 ignition element at UHF and microwave frequencies are given. Use of Wheatstone bridge techniques to measure average squib bridge wire temperature rise caused by UHF and microwave excitations is described and preliminary results are presented. Comparisons of thermocouple outputs from instrumented Mk 2 ignition elements at the 50% fire level using dc 250 mc are given. Measurements have been made to determine power absorption by the Mk 1 squib base at UHF and microwave frequencies. Progress of investigations of using both photoconductors and thermocouples to instrument EED's, reducing time response of thermocouples electronically and applying other types of detectors to instrumenting EED's is reported. (Author)

23. PERSONNEL AND TRAINING

No Entries

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-277 990 Div. 24
(TISTA/VGW) OTS price $2.60

Fairchild Camera and Instrument Corp., Syosset, N. Y.
QRC 183(T). F-415A CAMERA SYSTEM.
Final progress rept.
1 July 62, 22p. incl. illus.
(Contract AF 33(657)7759)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Wide field cameras, *Aerial cameras, Prisms (Optics), Panoramic scanners, Design, Flight testing, Effectiveness, Distortion.

Construction and flight testing are reported of the F-415A Rotary Prism Panoramic Camera. In the original design approach, the F-415A was optimized for achieving photographic coverage, horizon to horizon, while operating at an altitude of 500 feet with an airspeed of 600 knots. The maximum cycling rate of this system provides a capability of obtaining high quality pictures at an altitude of 275 feet and an airspeed of 600 knots. A forward overlap of 60% is maintained under this condition. (Author)

AD-278 061 Div. 24, 6
(TISTE/CDM) OTS price $12.50

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
DEVELOPMENT OF FIELD EMISSION FLASH X-RAY TUBES AND DEVICES,
by W. P. Dyke, F. J. Grundhauser and others.
Oct 61, 160p. incl. illus. tables, 28 refs.
(Bumblebee rept. no. 306)
(Contract NOrd-7386; In cooperation with Linfield Research Inst. and Field Emission Corp.)
Unclassified report

DESCRIPTORS: *X rays, *Flash lamps, *Flash radiography, *X-ray photography, *Electron tubes, *High intensity flash lamps, Thermionic emission, Field emission, Anodes (Electron tubes), Cathodes (Electron tubes), Pulse generators, Pulse transformers, Display

ING EXPLOSIVE BODY,
by H. J. Heinrich, tr. by Alex Palinkas. May 62, 28p. incl. illus. tables, 21 refs. (Technical notes no. FRL-TN-81; Trans. from Explosivstoffe 8:251-260, 1960)

Unclassified report

DESCRIPTORS: *Detonation, *Shock waves, Explosives, Velocity, Gases.

The expansion of aimed shock waves in the vicinity of a detonating explosive was examined. Color photographs taken with the revolving drum camera make possible a differentiation between the clouds of gases flowing from the surface of the explosive and the compression shock released by the detonation in the bordering gas. At lower pressures (p is less than 1/1000), the separation between shock wave and gas clouds occurs in the immediate vicinity of the explosives' upper surface, the shock wave velocity is 19,000 m/s, or more than twice the expansion velocity of the reaction products of the explosion. At higher pressures, however, the separation occurs only after a greater distance is covered, with a progressive decrease in the shock wave velocity. Tests conducted under various pressures show that the initial velocity of the shock wave decreases with increasing pressure and molecular weight of the gas used. The results can be identified with the theory of the expansion of steady shock waves. (Author)

AD-278 133 Div. 22, 10
(TISTM/JSM) OTS price $7.60

Space Technology Labs., Inc., Redondo Beach, Calif.
COMBUSTION OF EXPLOSIVES,
by F. A. Baum, trans. by Z. Jakubski, ed. by R. D. Kennedy. July 62, 68p. incl. illus. tables, 13 refs. (Rept. no. STL Trans. Series, no. 66 from Physics of Explosion (Fizika Vzryva) by F. A. Baum, K. P. Stanyukovich and B. I. Shekhter, Fizmatgiz, Moscow, 1959, Chap. 10, pp. 363-428)

Unclassified report

DESCRIPTORS: *Explosives, *Combustion, *Physics, *Explosions, USSR, Textbooks, Ignition, Gases, Flames, Explosive gases, Detonation, Pressure, Theory, Fulminates, TNT, TETN, RDX, Tetryl, Powders, Benzenes, Nitro radicals, Organic azides.

Contents: Section 50: Basic characteristics of combustion processes of explosives; Combustion of gaseous explosive systems; and Combustion and chain ignition. Section 51: Theories of thermal and chain ignition of gases; The nonstationary theory of thermal expansion; Flammability limits; Catalytic effect of admixtures; and Steady and nonsteady chain reactions. Section 52: Combustion of gases; Theory of thermal flame propagation; and Zeldovich - Frank-Kamenetskii combustion theory. Section 53: Combustion of condensed explosive materials; and Belyaev-Zeldovich theory of combustion of condensed explosives. Section 54: Combustion of gunpowder; Effect of pressure; and Mechanism of combustion of nitrocellulose powders. Section 55: Transition from deflagration to detonation; and Mechanism of transition from deflagration to detonation in gas mixtures.

AD-278 196 Div. 22, 1
(TISTA/GEC) OTS price $1.10

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
AZIMUTH KINEMATIC LEAD GENERATION FOR HELICOPTER ARMAMENT,
by R. C. Pfeilsticker and J. C. Glynn.
May 62, 8p. incl. illus.
(Memo. rept. no. M62-25-1)
(Proj. 503-05-020)

Unclassified report

DESCRIPTORS: *Helicopters, *Gun sights, *Aircraft guns, Couplings, Lead angle, Azimuth, Theory, Mathematical analysis, Automatic weapons, Small arms, Design, Armament.

A major source of error in firing rounds of 40 mm or less from a helicopter, using present armament systems, is due to helicopter velocity. A theoretical discussion of an eccentric coupling whose output has a form well suited to introduce horizontal lead signals into the weapon controls when engaging off course targets is presented. The eccentric coupling is compact and can be easily installed as a modification to present small caliber aircraft systems such as the XM138 (machine gun) and XM153 (40 mm cannon) systems. The introduction of the coupling to present small caliber helicopter armament systems would reduce present rms azimuth errors in gun aiming due to helicopter movement by a factor of 1/4. (Author)

AD-278 197 Div. 22
(TISTW/RD) OTS price $3.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
IGNITION DELAY STUDIES FOR CARTRIDGE 120MM, HEAT, XM419,
by J. Wallin. Apr 62, 34p. incl. illus. (Rept. no. R-1612)
(Proj. 502-09-010)

Unclassified report

DESCRIPTORS: *Antitank ammunition, High explosive ammunition, Ignition, Projectiles.

Data was obtained from static ignition tests through the use of high speed photography. It was found that the small orifice in the tail, at the boom adapter to tail joint, caused ignition delays of from 2 to 4 milliseconds. In addition, portions of the ignition cartridge were left unburned in the boom adapter and tail, hence reducing the efficiency of the propellant ignition. The total time required for flame travel from the rear end of the short ignition cartridge to the forward end of the long ignition cartridge was between 5 and 7 milliseconds. This length of time for flame propagation along the ignition cartridges is excessive. As a result, proper and timely ignition of the propellant was being affected, which in turn, adversely affected velocity uniformity. It is realized that the static ignition process under which these tests were made was different than that experienced in the weapon during an actual firing. Even so, the results obtained confirm the suspicion that the long ignition time was the principal cause of poor velocity uniformity. (Author)

AD-278 198 Div. 22
(TISTW/RD) OTS price $8.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
DEVELOPMENT OF PACKAGING SYSTEMS FOR CLIPPED NATO 7.62MM AMMUNITION,
by W. Rose. Mar 62, 89p. incl. illus. tables, 13 refs. (Rept. no. R-1620)
(Proj. 5S04-05-002)

Unclassified report

DESCRIPTORS: *Small arms ammunition, Packaging, Ammunition, Design.

25. PHYSICS

AD-277 998 Div. 25, 4
(TISTM/EJH) OTS price $1.10

Noyes Chemical Lab., U. of Illinois, Urbana.
ESR SPECTRUM AND SPIN DENSITIES FOR THE BIQUATERNARY BIPYRIDYL RADICAL CATION,
by C. S. Johnson, Jr., R. E. Visco and others.
4 June 62, 5p. incl. illus. (Technical rept. no. 53)
(Contract Nonr-183413, Proj. NR 051-215)
Unclassified report

DESCRIPTORS: *Pyridines, *Spectrographic analysis, *Hyperfine structure, Ions, Free radicals, Water, Deuterated compounds, Electrons, Spin, Resonance, Programming, Reduction, Chemical indicators, Hydrochloric acid, Complex compounds.

During the course of an investigation by ESR and polarographic techniques of the viologens, which are colored in reduced form, the spectrum of the biquaternary bipyridyl radical cation was obtained. Comparison of the experimental spectra with theoretical results indicates that the hyperfine splitting is the same for the 8 protons in the ortho and meta positions.

AD-277 999 Div. 25, 17
(TISTM/JSM) OTS price $1.10

Illinois Inst. of Tech., Chicago.
SHORT-RANGE FORCES IN ALLOYS.
Summary rept.,
by Leonid V. Azaroff. 16 July 62, 9p. incl. illus. 17 refs.
(Contract Nonr-140607, Proj. NR 031 684)
Unclassified report

DESCRIPTORS: *Alloys, *Atomic structure, *Aluminum alloys, *Chromium alloys, Crystal structure, Single crystals, Solutions, Solids, X-ray absorption analysis, X-ray diffraction analysis, Electrons, Ferromagnetism, Nickel alloys.

Attempts are being made to characterize the electronic structure of solute atoms present in small concentrations in solid solutions and to deduce what the short-range forces in such alloys are. X-ray absorption spectroscopy is being combined with X-ray diffraction methods for the investigation. The Cr end of the Cr-Al binary system is being studied regarding (1) the action of transition metals in alloys and (2) the relation of the electronic structure of Cr to the crystal structure of the intermediate phases occurring on the Cr side. A double-crystal spectrometer attachment was investigated for determining X-ray absorption spectra; resolution of the instrument was 7000. A constant-potential generator will hopefully give adequate voltage stabilization. Solid solutions of Ni-Cu and Ni-Al alloys were studied regarding the absorption-edge structure of Ni; the results showed that changes in the electronic structure of transition metals can be observed by X-ray absorption spectroscopy. Exploratory preparations were made of Cr-Al solid solutions and intermetallic single crystals.

AD-278 019 Div. 25
(TISTP/GRW) OTS price $2.60

Queen's U., Belfast (Gt. Brit.).
ELECTRON SCATTERING BY ATOMIC HYDROGEN IN THE 1s, 2s, OR 2p STATE,
by V. M. Burke and R. McCarroll. 1961, 14p. tables, 8 refs.
(Grant 61-16; In cooperation with University Coll., London (Gt. Brit.))
(AFCRL 62-660) Unclassified report

DESCRIPTORS: *Electrons, *Elastic scattering, *Inelastic scattering, *Hydrogen, Partial differential equations, Atomic mass unit, Equations of state, Tables.

Electron scattering cross-sections by hydrogen in the 1s 2s or 2p state were computed on the bases of an approximation, which includes all coupling terms between these states but which excludes all others. Full account is taken of electron exchange. Results were obtained at low energies of impact for those states of the system with low angular momentum. Comparison with earlier work indicates that the effect of coupling and exchange is very important. (Author)

AD-278 045 Div. 25
(TISTP/FR) OTS price $7.60

Warner and Swasey Co., Flushing, N. Y.
MEASUREMENT OF TEMPERATURES IN IONIZED GASES BY MEANS OF INFRARED RADIATION. I. INFRARED RADIATION AND TEMPERATURES OF PLASMAJETS. II. MEASUREMENT OF GAS TEMPERATURES IN THERMAL PULSES BY MONOCHROMATIC RADIATION PYROMETRY.
Final technical documentary rept. on Research on Aerodynamic Flow Fields and Research on Techniques in Aeromechanics,
by Richard H. Tourin, Paul M. Henry and others.
Mar 62, 68p. incl. illus. tables, 26 refs.
(Contract AF 33(616)6713, Projs. 7064 and 7065)
(ARL 62-314) Unclassified report

DESCRIPTORS: *Plasma jets, *Radiation pyrometers, *Temperature, *Infrared radiation, Measurement, Plasma physics, Gas ionization, Spectrographic analysis, Shock tubes, Infrared pulses, Gases, Nitrogen, Argon, Helium, Carbon compounds, Monoxides.

The application of monochromatic radiation pyrometry to measurement of plasma temperatures was investigated. Infrared emission and absorption spectra of nitrogen, argon, and helium plasma jets, with various admixtures, were measured, and plasma temperatures were determined from the infrared emission and absorption at selected wavelengths. Also, the infrared monochromatic radiation (IMRA) method of gas temperature measurement was applied to determination of gas temperature in thermal pulses. A detonation tube was constructed in which the infrared emission and absorption of a combustion wave could be measured through infrared-transparent windows. Infrared instrumentation was built to make measurements at the high speed required for observing thermal transients. (Author)

AD-278 049 Div. 25, 8
(TISTM/REB) OTS price $.50

David Sarnoff Research Center, Princeton, N. J.
HIGH TEMPERATURE SEMICONDUCTOR RESEARCH.
Scientific rept. no. 9, 1 Jan-31 Mar 62,
by J. Blanc, R. H. Bube and others. 30 Apr 62, 15p. incl. illus. tables, 10 refs.
(Contract AF 19(604)6152, Proj. 4608)
(AFCRL 62-336) Unclassified report

DESCRIPTORS: *Semiconductors, *Gallium compounds, *Arsenides, *Phosphides, Crystals, Growth, Lattices, Crystallization, Dissociation, Pressure, Alloys, Intermetallic compounds, High temperature research.

An important result has been derived for GaAs. It has been established that high concentrations

systems, Electronic circuits, Installation, Theory, X-ray spectrum, Design.

The feasibility of using T-F (thermionic and field) emission of electrons to develop high intensity flash X-ray sources was determined. The theoretical studies included an analysis of several different electrode geometries, and the optimum direction of radiation from some target designs of special interest. The flash X-ray spectrum is analyzed on a preliminary basis by the Silberstein-Jones absorption method, and the response of several different combinations of films and intensifying screens is determined for various radiation energy levels and flash durations. An account is given of the experimental program which led to the ultimate development of a multichannel pulsed X-ray system with TF tubes capable of delivering radiation flashes of either 0.2 or 1 microsecond duration at energy levels up to 300 kv and peak electron beam currents of 1000 amperes. The final design of the system and the tubes, and the field installation of the equipment are described. (Author)

AD-278 062 Div. 24, 30, 4
(TISTA/VGW) OTS price $4.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
A NEW METHOD FOR HIGH-SPEED MOTION-PICTURE PHOTOGRAPHY OF TRANSPARENT DROPS, by Albert Pfeiffer. Nov 61, 47p. incl. illus. 4 refs. (Rept. no. CRDLR 3105)
Unclassified report

DESCRIPTORS: *High speed photography, *Motion picture photography, *Drops, *Liquids, Aerosols, Glass, Spheres, Optical systems, Optical images, Visibility, Illumination, Brightness, Test methods.

A new method is described which is applicable to high-speed motion-picture photography of moving transparent drops. Previous methods have not considered the optical properties of drops as image forming, spherical convex lenses. By taking advantage of this property of transparent drops, it has been possible to produce sufficient light contrast between the drop and its background to enable photography of drops illuminated by diffused reflected light. It is concluded that high-speed motion-picture photography of transparent drops can be accomplished where it is possible to produce sufficient light contrast between the drop and its background so as to make the drop visible. Two highly satisfactory methods of producing this contrast were tested experimentally and found to produce an excellent technique which could be used for a variety of investigations in the aerosol field. (Author)

DESCRIPTORS: *Semiconductors, *Resonance, *Electrons, *Ions, *Magneto-optic rotation, *Quantum mechanics, Solids.

Contents:
Cyclotron resonance
  Theory and experiments
Intraband magneto-optical phenomena
  Intraband transitions
  Isotropic intraband magneto-optical effects
  Anisotropic intraband magneto-optical effects
Interband magneto-optical phenomena
  Interband dispersion and absorption
  Interband transitions in a magnetic field
  Magnetoreflection
  Indirect transitions
  Interband Faraday rotation
  Interband Voigt effect
Zeeman effect
  Zeeman effect of impurities
  Excitons

AD-278 085 Div. 25
(TISTP/GRW) OTS price $5.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
PROBABILITIES OF OPTICAL TRANSITIONS FOR ATOMS AND DIATOMIC MOLECULES,
by V. N. Kolesnikov and L. V. Leskov. June 62, 58p. incl. illus. tables, 370 refs. (Technical notes no. FRL-TN-137; Trans. from Uspekhi Fisicheskikh Nauk 65:3-38, 1958)
Unclassified report

DESCRIPTORS: *Electron transitions, *Atomic spectrum, *Molecular spectroscopy, Tables, Bibliography, Functions, Probability, Forbidden transitions.

A literature review was made of theoretical and experimental papers which appeared since 1930 on the determination of the probabilities of optical transitions in atoms and electron-vibration transitions in diatomic molecules. The appended bibliography contains 370 items.

AD-278 098 Div. 25
(TISTP/FR) OTS price $7.60

General Telephone and Electronics Labs., Inc., Palo Alto, Calif.
ENERGY TRANSFER IN PLASMA.
Final rept.,
by J. E. Hopson and J. Kannelaud. 26 Mar 62, 66p. incl. illus. 21 refs.
(Contract AF 30(602)2452, Proj. 5561)
(RADC TDR 62-186) Unclassified report

DESCRIPTORS: *Plasma physics, Shock waves, Shock tubes, Gas discharges, Helium, Radio interferometers, Microwaves, Light, Absorption, Magnetic fields, Optics, Molecular structure, Spectrographic analysis, Infrared radiation, Space charges.

The items studied were: (1) diagnostic techniques for determining shock wave characteristics, (2) the reflectivity and absorptivity of a plasma due to inhomogeneities, and (3) the absorption of microwave energy by a plasma due to atomic and molecular processes. (Author)

AD-278 100 Div. 25
(TISTP/FR) OTS price $1.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
MASS SPECTROMETRIC STUDY OF ION-MOLECULE REACTIONS OCCURRING AT THERMAL ENERGIES UNDER GAS KINETIC CONDITIONS.
Final interim rept.,
by D. W. Martin and W. S. Barnes. 31 Mar 62, 11p.
(Contract AF 49(638)1064; Continuation of Contract AF 18(600)1524)
(AFOSR-2769) Unclassified report

DESCRIPTORS: *Ions, *Molecules, *Gases, *Mass spectroscopy, Nitrogen, Hydrogen, Mass spectrometers.

Ion-molecule reactions occurring at near-thermal energies in a gas were studied by a method in which the products of such reactions are identified by means of a mass spectrometer. Special apparatus for this study was developed. Activity consisted of exploration of the potentialities of this apparatus, making modifications and improvements where desirable, and application of the apparatus to studies of certain ion-molecule reactions of basic general interest. (Author)

AD-278 101 Div. 25
(TISTP/FR) OTS price $3.60

Harvard U. Div. of Engineering and Applied Physics, Cambridge, Mass.
PLASTIC BUCKLING OF THIN SHALLOW SPHERICAL SHELLS,
by Robert S. Roth. May 62, 25p. illus. 12 refs.
(Technical rept. no. 13)
(Contract Nonr-186602)
Unclassified report

DESCRIPTORS: *Structural shells, Deformation, Elasticity, Plasticity, Pressure.

The effect of plasticity on the buckling load of a shallow spherical shell cap which is clamped about its edge and subjected to an external pressure was investigated. The shell is a sandwich idealization of a uniform shell and is made of a Prandtl-Reuss material. The problem of finding the buckling load of the cap is solved by using a variational principle written in terms of displacement rates and the current state of stress in the shell. A Rayleigh-Ritz technique is used to obtain the final solution to the problem and regions of loading and unloading are determined throughout the shell. The results of the study are in agreement with the elastic solutions which have already been determined and with studies of the plastic collapse of a spherical cap made of a rigid perfectly plastic material. The results bridge the gap which now exists between these two extreme situations. (Author)

AD-278 108 Div. 25
(TISTW/RD) OTS price $1.60

Laboratory of Astrophysics and Physical Meteorology, Johns Hopkins U., Baltimore, Md.
FAR INFRARED INTERFEROMETRIC SPECTROSCOPY.
Final rept.,
by John Strong. 1 Feb 62, 9p. 21 refs.
(Contract AF 18(600)1307, Proj. 9768)
(AFOSR-2422) Unclassified report

DESCRIPTORS: *Infrared spectroscopy, Interferometers, Integral transforms, Chlorates, Potassium compounds, Infrared radiation.

Research concerning the first practical application of Fourier transformation used to obtain high resolution spectroscopic information from two-beam interferometric observations is summarized. This procedure is applied in the far infrared by a lamellar grating interferometer. The procedures have been used to determine the spectra of gases and solids. A quantitative explanation of interference effects that produce the iridescence of crystals of $KClO_3$ was developed. (Author)

of lattice defects (greater than 10 to the -19th power cc) can be introduced into high resistivity GaAs under appropriate annealing conditions. It is believed that the defects are present in a latent or electrically inactive form in as-grown GaAs. Experiments are being carried out to further identify these defects. This is the first time that unambiguous evidence has been adduced for high concentrations of lattice defects in and III-V compound. The high pressure magnetic Czochralski apparatus for GaP is now operating in a routine fashion, and several polycrystalline ingots have been pulled. Minor improvements are being carried out, and variations in phosphorus pressure and thermal conditions are being attempted in an effort to produce large single crystals. Accurate measurements have been made on the dissociation pressure of GaAs from about 1100 C to the melting point. The dissociation pressure close to the stoichiometric melting point (1238 C) was found to be 740 mm Hg, which is higher than previously reported values. (Author)

AD-278 050 Div. 25, 14, 8
(TISTE/CDM) OTS price $3.00

David Sarnoff Research Center, Princeton, N. J.
MAXIMIZING THE PERFORMANCE OF PHOTOCONDUCTORS.
Scientific rept. no. 2, 15 Sep 61-15 Mar 62,
by J. Blanc, R. H. Bube and others. 14 Mar 62,
143p. incl. illus. tables, 65 refs.
(Contract AF 19(604)8353)
(AFCRL 62-158) Unclassified report

DESCRIPTORS: *Photoconductivity, *Single crystals, *Crystals, *Cadmium compounds, Sublimation, Photoelectrons, Hall effect, Excitation, Chemical analysis, Photons, Gallium compounds, Arsenides, Electric currents, Electrodes, Measurement, Laboratory equipment, Electrometers, Thermal conductivity, Crystal structure, Tests, Sensitivity, Sulfides.

A simple analysis of the limitations on photoconductivity performance of a sensitive photoconductor like CdS indicates that ultimate likely success in materials control and development will not yield a material with response time less than 1/10-second for .0001 ft-c illumination or lower. The initial stages of success in preparing larger crystals of CdS with impoved photoconductivity performance for low light intensity excitation have been achieved. Large boules of pure CdS and of CdS with controlled impurities, in sizes of 12 mm in diam. and 40 mm long, have been prepared by sublimation or chemical transport with a moving temperature gradient. The reality of trap densities of the order of 10 to the 19th power 1/cc in annealed gallium arsenide crystals was substantiated and evidence presented relating these traps to crystal defects. Apparatus capable of measuring mobilities in material with conductivity as low as 10 to the -10th power ohm/cm over the temperature range from 77 to 450 K was put into operation. Photovoltage measurements on cadmium sulfide crystals were used to obtain basic information about the nature of surface states. (Author)

AD-278 053 Div. 25
(TISTP/WH) OTS price $13.00

Technical Research Group, Syosset, N. Y.
RESEARCH ON PROPERTIES OF LASER DEVICES.
VOLUME I,
ed. by Maurice C. Newstein and Sondra A. Rothberg. 2 July 62, 181p. incl. illus. tables, refs.
(Rept. no. TRG-134-TR-7)
(Contract AF 49(638)673)
Unclassified report

DESCRIPTORS: *Lasers, *Design, Cesium, Ruby, Tuned circuits.

Three major analytical tasks were performed. These consisted of the analysis of the modes of a resonator with a Pin-Hole Suppressor, of amplifier performance, and of pulse oscillator performance. A cesium gas LASER, optically pumped by a helium discharge has been made to oscillate at a wavelength of 7.18 microns. High gain He-Ne discharge LASERs were constructed and used in the investigation of tunable LASERs and the study of oscillators terminated by prism reflectors. Preliminary experimental verification was obtained for a theory of the normal pulse output from the ruby LASER. A spinning prism Q-switch was used to induce very high peak power pulses from rods of ruby (greater than 10 megawatts) and Nd doped glass (greater than 2 megawatts). The results appear to be within 50% of optimum as predicted by the theory developed under analytical tasks. (Author)

AD-278 070 Div. 25
(TISTP/FR) OTS price $1.10

Cavendish Lab., U. of Cambridge (Gt. Brit.).
COMMENTS ON THE NEUTRON SPECTRUM OF FERROELECTRIC AND PARAELECTRIC $BaTiO_3$,
by I. Lefkowitz. 1962, 8p. incl. illus. table, 15 refs. (Special rept. no. 1)
(Contract DA 91-591-EUC-1925)
Unclassified report

DESCRIPTORS: *Barium compounds, *Titanates, *Neutron spectroscopy, Infrared spectroscopy.

Insight into ferroelectric phenomena has been gained using lattice-dynamical arguments. Early infra-red measurements were misleading. More recent infra-red and neutron work coupled with the theoretical results of Kurosawa permit the assignment of L.O. and T.O. modes that are in good agreement with peaks observed in the neutron spectrum of $BaTiO_3$. (Author)

AD-278 071 Div. 25, 24
(TISTP/WH) OTS price $1.10

Cavendish Lab., U. of Cambridge (Gt. Brit.).
A DEVICE FOR TAKING X-RAY PHOTOGRAPHS OF SINGLE CRYSTALS AT HIGH TEMPERATURES,
by Issai Lefkowitz and Helen D. Megaw. 1962,
5p. illus. 1 ref. (Special rept. no. 2)
(Contract DA 91-591-EUC-1925)
Unclassified report

DESCRIPTORS: *X-ray photography, *Single crystals, *High temperature research, Diffraction.

A device is described for taking single crystal X-ray photographs at temperatures up to 1000 C. The crystal furnace mount fits on a standard single crystal goniometer and is therefore interchangeable between oscillation, Weissenberg and precession diffractometers. A modification of a Weissenberg diffractometer to take the device is described. No cooling of the film cassette is needed. (Author)

AD-278 081 Div. 25
(TISTP/WH) OTS price $8.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
CYCLOTRON RESONANCE AND MAGNETO-OPTICAL EFFECTS IN SEMICONDUCTORS,
by Benjamin Lax and John Halpern. 30 Apr 62,
92p. incl. illus. 79 refs. (Technical rept. no. 249)
(Contract AF 19(604)7400)
(AFESD TDR 62-100) Unclassified report

The equations of motion for large deformation of a thin elastic cylindrical shell are derived and simplified to a form second order theory which is adequate for investigating the dynamic stability of the shell. A review of linear vibrations is presented. The response of a cylindrical shell to a uniform impulsive pressure is investigated. It is found that the circular mode of vibration, which is the basic response of the shell, may be unstable, the shell going over into bending modes of vibration. A criterion is established for predicting the bending modes excited. It is shown that the type of instability involved corresponds to what is known as autoparametric excitation in non-linear oscillations. Uniform impulsive pressure of sufficient magnitude to cause inward plastic flow is considered. The analysis is carried out for a stress-strain relation which includes purely viscous, visco-plastic, and linear strain hardening materials as special cases. It is shown that a series of wrinkles develops around the circumference as the shell flows inward. The wrinkling arises from magnification of the irregularities in the initial radial velocity due to the compressive membrane force in the shell. (Author)

AD-278 150 Div. 25
(TISTP/FR) OTS price $2.75

Westinghouse Electric Corp., Pittsburgh, Pa.
P-N JUNCTION FORMATION BY ION BOMBARDMENT.
Final rept.,
by R. R. Ferber. May 62, 162p. incl. illus. tables.
(Contract AF 33(616)7715, Proj. 8173)
(ASD TDR 62-428) Unclassified report

DESCRIPTORS: *Ion bombardment, *Silicon, *Solar cells.

The feasibility of producing silicon solar cells by ion bombardment, with a goal of 15% efficiency in the conversion of solar to electrical energy was investigated. The effects of ion energy and bombardment at various temperatures were studied for hydrogen, nitrogen, oxygen, neon, xenon and phosphorus. A two million volt Van de Graaff accelerator and a 250 kv Cockroft Walton accelerator were used to produce ions with energies ranging from 50 kev to 1 Mev. Bombardments with each of the gaseous ions have produced type conversion in p-type silicon. The n-type layers produced all have rather high resistivities (1 ohm-cm or higher) with very weak n-type conductivity characteristics. These junctions were produced by radiation damage induced donor sites and might more appropriately be called p-i junctions. Only the phosphorus ion bombardments show evidence of impurity or chemical doping effects. The radiation damage is so great, however, that it dominates the cells' characteristics and the best solar conversion efficiencies observed have been in the order of 0.01%. (Author)

AD-278 153 Div. 25
(TISTP/TL) OTS price $2.60

Yale U. Observatory, New Haven, Conn.
RADIATION LAWS UNDER NON-EQUILIBRIUM CONDITIONS.
Rept. on Research on Particle Dynamics,
by Ludwig Oster. Apr 62, 18p. 18 refs.
(Contract AF 33(657)7271, Proj. 7073)
(ARL 62-320) Unclassified report

DESCRIPTORS: *Quantum mechanics, *Bremsstrahlung, *Cyclotrons, *Thermodynamics, *Plasma physics, High temperature research, Quantum statistics, Probability, Thermionic emission, Conductivity, Absorption, Particles, Heat transfer, Energy, Magnetic fields.

The familiar radiation laws are reviewed, showing that the phenomenological coefficients of emission, absorption and conductivity are merely variants of the same basic quantity and can be readily transformed into each other. It follows that for a specific emission or absorption mechanism the calculation of either one of the coefficients is sufficient. The atomistic coefficients of spontaneous emission, absorption and induced emission and their mutual relations are then derived from Einstein's quantum probabilities for the case of radiative transitions of free particles. The concepts of thermodynamic equilibrium, steady state and detailed balancing are recalled. The energy transfer equation and its solution are discussed. In high temperature plasmas the atomistic radiation mechanisms of bremsstrahlung and cyclotron radiation are the most prominent ones. Cross sections are given for both processes, including quantum effects. Finally, emission and absorption coefficients are derived for arbitrary non-equilibrium plasmas. (Author)

AD-278 170 Div. 25
(TISTP/FR) OTS price $11.00

American Machine and Foundry Co., Niles, Ill.
THEORETICAL STUDY OF GROUND MOTION PRODUCED BY NUCLEAR BLASTS.
Final technical rept.,
by Gabriel Cinelli and Leif Erik Fugelso.
30 Oct 59, 139p. incl. illus. 35 refs.
(Contract AF 29(601)1190, Proj. 1080)
(AFSWC TR 60-8) Unclassified report

DESCRIPTORS: *Soils, *Earth, *Motion, Nuclear explosions, Blast, Elasticity, Integral transforms, Integral equations.

Free-field ground motions for use in the design of underground protective structures are studied. Two-dimensional motion of an elastic half-plane under an exponentially decaying normal load traveling at constant velocity along the boundary is determined analytically and the results are presented graphically. Analytic expressions in integral form are obtained for three-dimensional axisymmetric motion of an initially quiescent homogeneous isotropic elastic half-space under an arbitrary axisymmetric time-dependent normal loading, and these expressions are utilized for the special cases of a concentrated normal point load and a uniform concentrated normal ring load suddenly applied and thereafter maintained at a fixed position on the plane boundary. Analytic expressions in integral form are obtained for the three-dimensional axisymmetric motion of a homogeneous isotropic visco-elastic half-space under identical conditions as for the elastic case. (Author)

AD-278 177 Div. 25, 4
(TISTM/EJH) OTS price $2.60

Uppsala U. (Sweden).
X-RAY STUDIES OF MOLYBDENUM AND TUNGSTEN PHOSPHIDES,
by Stig Rundqvist and Torsten Lundstrom.
3 July 62, 12p. illus. tables, 18 refs. (Technical note no. 33)
(Contract AF 61(052)40)
(AFOSR-2993) Unclassified report

DESCRIPTORS: *Molybdenum compounds, *Tungsten compounds, *Phosphides, *Phase studies, *Crystal structure, Intermetallic compounds, Crystals, Lattices, X-ray diffraction analysis.

The Mo-P and W-P systems were studied by X-ray powder methods. In addition to previously reported phases, Mo_3P, MoP, MoP_2, WP and WP_2, the occurrence of a phase with the approximate

Division 25 - PHYSICS

AD-278 109 Div. 25
(TISTB/MS) OTS price $8.10

Paris U. (France).
DYNAMICAL THEORY OF THE REFLECTION OF X-RAYS BY NON-PERFECT CRYSTALS, PART I.
Final technical rept.,
by D. Taupin. Mar 62, 1v. incl. illus. refs.
(Contract AF 61(052)310)
(AFOSR-2963) Unclassified report

DESCRIPTORS: *X-ray diffraction analysis, *X rays, Theory, Solid state physics, Equations, Distortion, Crystals, Crystal structure.

This report includes:
CRYSTALLINE TEXTURE OF BaTiO3 CRYSTALS, PART II. Final technical rept., by C. Bousquet, M. Lambert and others. 31 Mar 62.

A generalization of Zachariasen's Dynamical Theory is derived for the case of distorted or non-perfect crystals and non-plane waves; this treatment does not separate the wavefields in the crystal medium and leads to a partial differential equation system which can only be numerically solved. A detailed application to bent and uniformly distorted crystals is given, which is a generalization of our former dynamical theory. A rough calculation of dislocation cross sections for the Bragg Case is then reported. Some figures are given, which indicate the range of utility of the X-Ray method for the determination of the perfection of Silicon crystals. Experimental measurements of reflecting powers of imperfect Silicon crystals have been made. The agreement with calculated values is rather satisfactory. (Author)

AD-278 115 Div. 25
(TISTW/DLW) OTS price $7.60

Johannes Gutenberg-Universitat (Germany).
INVESTIGATION OF THE INFRARED EMISSION SPECTRUM OF THE ATMOSPHERE AND EARTH,
by Hans-Jurgen Bolle, Fritz Moller, and Heinrich Quenzel. Dec 61, 71p. incl. illus. tables, 13 refs.
(Contract AF 61(052)246)
(AFCRL-62-624) Unclassified report

DESCRIPTORS: *Infrared radiation, *Infrared spectroscopy, *Infrared filters, *Infrared research, Meteorological data, Germany, Infrared spectrophotometers, Measurement, Earth, Calibration, Test methods, Infrared equipment, Atmosphere.

A transportable grating spectrometer and an actinograph working with interference filters were constructed in order to investigate the infrared sky radiation in dependence of different meteorological conditions. The spectrometer is equipped with an echelette grating. By choice gratings with a blaze at 10, 12 or 20 microns can be used. It makes possible measurements of sky or ground emission spectra and of the difference between two radiation fluxes. The interference-filter actinograph is mainly an auxiliary equipment to control the total water vapour content of the atmosphere. The design of the instruments, calibration procedures and the performance of measurements are described. (Author)

AD-278 131 Div. 25, 9
(TISTP/WH) OTS price $13.00

Physics, Engineering, Chemistry Corp., Boulder, Colo.
INVESTIGATION OF THE DYNAMICS OF IONIZED MEDIA (PLASMAS).
Final technical rept. on Mathematical Techniques of Aeromechanics,
by Wesley E. Brittin. Apr 62, 179p. incl. illus. 36 refs.
(Contract AF 33(616)7586, Proj. 7071)
(ARL 62-334) Unclassified report

DESCRIPTORS: *Plasma physics, *Kinetic theory, *Gases, Integral equations, Mathematical analysis.

Methods of treating dilute plasmas were studied. Emphasis was placed on fundamental rather than semi-empirical methods. The analysis is essentially a detailed account of the Prigogine school's approach to non-equilibrium statistical mechanics. The starting point is the Liouville equation describing the motion of the entire system. The advantage of using the Liouville equation is that it is linear as contrasted to the non-linear equations of dynamics. The Liouville equation is solved (initial value problem) formally by means of the resolvent expansion technique. Terms in the expansion are associated with diagrams, which are then used to study properties of the terms. Classes of diagrams which are relevant to physical situations can in some cases be summed and lead to macroscopic equations of transport. The procedure is illustrated for weakly interacting systems. (Author)

AD-278 134 Div. 25
(TISTP/TL) OTS price $1.60

Leyden State U. (Netherlands).
RESEARCH ON STATISTICAL MECHANICS AND THERMODYNAMICS OF IRREVERSIBLE PROCESSES.
Technical rept., 10 Oct 57-28 Feb 62.
30 May 62, 11p.
(Contract AF 61(052)16)
(AFOSR-2976) Unclassified report

DESCRIPTORS: *Quantum statistics, *Thermodynamics, *Irreversible processes, *Statistical distributions, *Statistical functions, *Gases, *Harmonic oscillators, Particles, Kinetic theory, Integral equations, Neutrons, Probability, Transport properties, Entropy, Chemical reactions.

The following research was completed: (1) Research on the quantum statistical mechanical basis of non-equilibrium thermodynamics, with the use of the formalism of Wigner-distribution functions; (2) Research on irreversibility, ergodicity and Poincare cycles in harmonic oscillator assemblies; (3) Research on chemical kinetics from the point of view of the Boltzmann kinetic theory of gases; (4) Research on the relations between path integrals and variational principles of Hamilton; and (5) Research on the behaviour of entropy in Gaussian-Markoff processes. (Author)

AD-278 136 Div. 25
(TISTA/WAW) OTS price $10.50

Stanford U. Div. of Engineering Mechanics, Calif.
DYNAMIC STABILITY AND NON-LINEAR OSCILLATIONS OF CYLINDRICAL SHELLS (PLANE STRAIN) SUBJECTED TO IMPULSIVE PRESSURE,
by J. N. Goodier and I. K. McIvor. June 62, 123p. incl. illus. 23 refs. (Technical rept. no. 132)
(Contract Nonr-22529, Proj. NR-064-241)
Unclassified report

DESCRIPTORS: *Elastic shells, Cylindrical bodies, Stability, Oscillation, Stresses, Deformation, Dynamics, Elasticity, Plasticity, Vibration, Differential equations, Partial differential equations, Integral equations, Mathematical analysis.

diffusion effects in the expansion of a binary mixture of gases in a shock tube. The results of calculations for mass diffusion effects on ideal shock tube flow of a binary compression chamber gas are compared with experimental data. (Author)

AD-278 201 Div. 25, 30, 22
(TISTM/EJH) OTS price $1.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
STRESS WAVES DUE TO EXPLOSIVE AND MECHANICAL LOADING OF LOW MODULUS PHOTOELASTIC MATERIALS,
by P. D. Flynn, J. C. Feder and others. Apr 62, 15p. incl. illus. 13 refs. (Rept. no. A62-4)
(Proj. 599-01-004)
Unclassified report

DESCRIPTORS: *Photoelasticity, *Stresses, Synthetic rubber, Deformation, Loading, Impact shock, Explosions, Photographic analysis, High speed photography, Urethanes, Test methods, Analysis.

A two-dimensional photoelastic study was made of the stresses produced in a square plate of low modulus material resting on one edge and subjected to either explosive or mechanical loading at the center of the opposite edge. Using the method of oblique incidence, the principal stresses were separated at various points on the line of stress symmetry. Normal and oblique incidence stress patterns were photographed at exposures of 1.3 and at a rate of 7500 pictures per second, approximately. Results are given for the period of time that it takes the initial stress wave to traverse the plate and reflect from the supported edge. The influence of the type of loading is discussed. (Author)

AD-278 203 Div. 25, 17
(TISTM/EJH) OTS price $5.60

General Mills, Inc., Minneapolis, Minn.
INVESTIGATION OF SURFACE PHENOMENA WITH ELECTRON MIRROR MICROSCOPY.
Final rept. on Surface and Interface Phenomena of Matter,
by R. C. Menard, A. A. Anderson, and W. W. Roepke. Apr 62, 52p. incl. illus. tables, 49 refs.
(Contract AF 33(616)6178, Proj. 7022)
(ARL 62-333) Unclassified report

DESCRIPTORS: *Thin films, *Titanium, *Friction, *Monomolecular films, *Lubrication, Surfaces, Films, Oxides, Vapors, Butyl radicals, Amines, Low pressure research, Barium compounds, Stearates, Electron microscopes, Antiseize compounds, Lubricants, Test equipment, Detection, Surface properties.

The electron mirror microscope was used to observe monolayers of long chain, polar organic compounds deposited on smooth metallic substrates. A 24.4 angstroms step from the uncovered substrate to a compact monolayer of barium stearate was readily detected as were wear tracks created by normal loads as small as 10 mg. Thin surface films on Ti were studied with light load friction experiments in a vacuum. Samples were prepared by mechanical polishing followed by sputter cleaning. Experiments were conducted with three surfaces: clean Ti, oxide coated Ti, and Ti coated with monolayers of polar organic compounds. Sputter cleaned Ti samples exhibited friction coefficients in high vacuum of 2.0 independent of load. A load effect was observed when thermal oxide layers were applied to Ti, the friction coefficient being higher at light loads than at heavier loads. As the oxide thickness increased, heavier loads were required to form a wear track visible by optical microscopy. Friction measurements made on Ti surfaces at n-butylamine vapor pressures of 0-2000 micron Hg revealed a rapid drop in coefficient of friction with increasing vapor pressure to a minimum value at 200-300 microns Hg. The coefficient was independent of load in the 200-400 mg range. (Author)

AD-278 209 Div. 25, 14
(TISTM/EJH) OTS price $2.60

Honeywell Research Center, Hopkins, Minn.
THE TENSILE STRENGTH OF MAGNESIUM OXIDE,
by R. J. Stokes and C. H. Li. June 62, 23p. incl. illus. 13 refs. (Technical rept. no. 16)
(Contract Nonr-245600, Proj. NR-032-451)
Unclassified report

DESCRIPTORS: *Crystals, *Magnesium compounds, *Oxides, Deformation, Plastic flow, Stresses, Surfaces, Impurities, Surface properties, Porosity, Fracture (Mechanics), Mechanical properties, Ceramic materials, Tensile properties.

Fully dense magnesium oxide bi-crystals and tri-crystals were chemically polished very carefully to remove all the fresh slip dislocation sources normally present in the surface and then tested in tension. With this surface condition bi-crystals deform elastically up to extremely high stresses (> 110,000 psi) before separating from the tensile grips. Such a high strength is rarely achieved in practice because of two limiting factors, first, slip in the individual grains and second, residual porosity. When slip occurs, cracks are nucleated at the grain boundary due to dislocation pile up. Fracture then occurs without ductility at the low tensile stress required to initiate slip (8,000 psi). In conventional polycrystalline material, prepared by sintering or hot pressing, there is inevitably some residual porosity at the grain boundaries. The intrinsic intergranular strength is reduced and brittle fracture occurs at 10,000 psi. (Author)

AD-278 213 Div. 25,
(TISTM/JSM) OTS price $2.60

Illinois U., Urbana.
PASSIVITY OF IRON AND NICKEL.
Final rept. on Protection Against Corrosion,
by J. H. Bartlett, W. P. Perkins and others. 15 June 62, 26p. incl. illus. 16 refs. (Technical rept. no. 8)
(Contract DA 11-022-ORD-3442, Proj. TB-2-0001)
(AROD rept. no. 2694.2) Unclassified report

DESCRIPTORS: *Iron, *Nickel, *Electrodes, *Electrolysis, Electrolytic cells, Anodes (Electrolytic cell), Cathodes (Electrolytic cell), Electric currents, Electric potential, Corrosion, Metals, Coatings, Sulfuric acid, Electrical properties.

Electrical behavior of passive iron: The subpassive region is defined as that between -0.2 and +0.1 v where the current drops from 45 to 3 microamps. A curve shows the dependence of the logarithm of steady-state current on steady-state voltage in the region; the data were taken at 23 C in 2N H_2SO_4. Investigation of anodic reduction and concentration effects do not substantiate the claim of Sukhotin (J. Phys. Chem. (USSR) 32:1632, 1958) that a second plateau exists for an open-circuit break at low concentrations; the conclusion is that his second plateau occurred because the acetate buffer acted as a complexing agent. Passivation of nickel:

composition MoP0.75 was established. The unit cell dimensions for Mo3P, MoP and WP were redetermined. Some data supporting the hypothesis of an ordered distribution of P atoms in WoP (WC-type structure) are given. Structures of the isostructural MoP2 and WP2 were determined, and the MoP2 structure was refined from X-ray powder data. The orthorhombic unit cell dimensions (in angstroms) are for MoP2 : a = 3.145; b = 11.184; c = 4.984; and for WP2 : a = 3.166; b = 11.161; c = 4.973. The space-group comprises four metal atoms and eight P atoms in three sets of fourfold positions. The structure is related to the ZrSi2 (C 49) type. (Author)

AD-278 179 Div. 25
(TISTP/TL) OTS price $2.60

Vienna U. (Austria).
THE PRESENT STATUS OF THE NEW RESONANCES,
by A. P. Balachandran and H. Pietschmann.
30 May 62, 28p. incl. tables, 226 refs.
(Scientific note no. 14)
(Contract AF 61(052)265)
(AFOSR-2978) Unclassified report

DESCRIPTORS: *Resonance, *Particles, *Mesons, *Pions, Scattering, Kinetic theory, Elasticity, Meson cross sections, Tables, Theory, Austria.

The available experimental material on the resonances observed in systems of strongly interacting particles is presented. The report confines itself strictly to well-established facts and although references to the various phenomenological models proposed to understand these resonances are given, none of the conclusions reached purely from such models are included in the tables for these resonances. (Author)

AD-278 185 Div. 25
(TISTA/WH) OTS price $2.60

Cornell U., Ithaca, N. Y.
SCATTERING AND CONVERSION CROSS SECTIONS IN INHOMOGENEOUS PLASMA,
by M. Cohen. 1 May 62, 28p. incl. illus.
11 refs. (Research rept. no. RS 38; Scientific rept. no. 3)
(Contract AF 19(604)8804)
(AFCRL-62-310). Unclassified report

DESCRIPTORS: *Plasma physics, *Scattering, Electromagnetic waves, Propagation, Plasma oscillations.

A general scattering theory is developed for a magnetic-field-free plasma, allowing for both transverse and longitudinal waves. The four cross sections are derived; these give the scattered components in terms of the frequencies of the incident and scattered waves, and the intensities of the appropriate components in the spectrum of density variations. The theory includes several other scattering formulations as special cases. A number of special features of the cross section formulas are discussed. The effect of thermal irregularities is considered. Ionosphere incoherent scatter experiments, and solar Type II and III bursts, are discussed qualitatively. (Author)

AD-278 186 Div. 25, 14, 4, 30
(TISTM/JSM) OTS price $2.60

Callery Chemical Co., Pa.
DETERMINATION AND ANALYSIS OF THE POTENTIALITIES OF THERMAL ENERGY STORAGE MATERIALS.
Quarterly rept. no. 4, 1 Apr-30 June 62,
by K. W. Beahm, C. F. Boynton and others.
30 June 62, 28p. incl. illus. tables.
(Contract AF 33(616)7224)
Unclassified report

DESCRIPTORS: *Storage, *Enthalpy, *Thermal conductivity, Containers, Materials, Liquids, Heat transfer, Energy, Boron compounds, Nitrides, Lithium compounds, Borates, Aluminum compounds, Oxides, Calcium compounds, Silicides, Density.

Compatibility tests to find materials suitable for containing molten thermal energy storage materials have been completed. Fansteel-80 and boron nitride appear to be the most suitable materials for containing molten lithium metaborate. Aluminum oxide and boron nitride are the most promising containment materials for calcium silicide--no metals are satisfactory for this compound. The heat content measurements on calcium silicide were continued through the melting temperature. Heat of fusion of calcium silicide was determined to be 245 ± 15 BTU/pound at the melting temperature of 1895 ± 55 F. Heat release rate measurements were made on lithium metaborate in the nickel block calorimeter. Results show a rapid drop in heat release rate as the fusion front moves from the outside wall of a cylindrical capsule toward the center. This indicates that a cylinder is not an efficient configuration for a thermal energy storage material container. Two values for the thermal conductivity of molten lithium metaborate are 3.2 and 3.8 BTU/hr-sq ft/ft. Attempts to measure the density and viscosity of molten calcium silicide failed. The density of solid calcium silicide was 2.5 grams/ml. (Author)

AD-278 189 Div. 25, 14
(TISTM/JSM) OTS price $2.60

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Progress rept. no. 6, 12 Mar-11 June 62,
by H. Dean Batha and D. P. H. Hasselman.
20 June 62, 21p. incl. illus. tables, 14 refs.
(Contract NOw 61-0676-c)
Unclassified report

DESCRIPTORS: *Single crystals, *Silicon compounds, *Carbides, Ceramic materials, Elasticity, Fracture (Mechanics), Deformation, Shear stresses, Mechanical properties, Carbides.

Mechanical properties of vapor phase grown single crystals of silicon carbide were determined. Preliminary results for elastic properties and crossbending strength are reported. Values of strength were obtained in excess of one million psi. The effect on strength of various methods of specimen preparation was investigated. Considerable scatter is obtained for elastic properties due to specimen non-uniformity. Observations were also made on the type of fracture which is obtained. Some etchpit studies were also initiated. (Author)

AD-278 199 Div. 25, 9
(TISTP/FR) OTS price $4.60

Pitman-Dunn Labs. Group, Frankford Arsenal, Philadelphia, Pa.
DIFFUSION IN EXPANDING ELECTRICALLY NEUTRAL GASES WITH LARGE PRESSURE GRADIENTS. PART III: SHOCK TUBE EXPERIMENTS,
by D. J. Katsanis. May 62, 44p. incl. illus. tables, 6 refs. (Memo. rept. no. M62-4-3)
(Proj. 59925001)
Unclassified report

DESCRIPTORS: *Shock tubes, *Gas diffusion, Pressure, Helium, Argon, Nitrogen; Mixtures.

An attempt was made to evaluate, by experiment, the accuracy of theoretical estimates of mass .

both free-surface reflections in a homogeneous media and propagation in inhomogeneous media. The dual problem of the purely rotational source is also solved. Collectively, the two problems illustrate how the asymptotic theory may, by terminating, yield an exact solution for an arbitrary wave form. (Author)

AD-278 293 Div. 25
(TISTP/WH) OTS price $1.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
ON THE WEIGHT AND DESIGN OF A REDUNDANT TRUSS.
Technical rept. on Mechanics of Flight,
by Robert J. Mayerjak. Apr 62, 14p. incl. illus. 4 refs. (Rept. no. ARL 62-338)
(Proj. 7063) Unclassified report

DESCRIPTORS: *Stresses, *Mathematical analysis, *Structures, *Statics, *Elasticity, Design, Load distribution.

The weight of a redundant, pin-jointed, planar truss of a given outline which supports alternative loadings is treated. The weight is regarded as a function of the relative areas of the members. It is difficult to obtain a clear understanding of this function if the truss has many members. However, for a three member truss, it is shown that the weight of all possible designs can be presented clearly as a single surface on a three dimensional graph. The effects of various strength criteria (entirely elastic, yielding with shakedown to elastic, and plastic without shakedown) are demonstrated by presenting appropriate surfaces on the same graph. The state of stress within the truss at proportions of low weight is discussed also. The concept of a 'fully-stressed' or 'balanced' design in which each member attains its maximum allowable stress at some time during the loading history is sometimes useful, but not always attainable. Some diagrams are used to illustrate the effect of continuity requirements on the attainability of balanced design. (Author)

AD-278 352 Div. 25, 8, 4
(TISTM/EJH) OTS price $4.60

Battelle Memorial Inst., Columbus, Ohio.
STUDY OF SEMICONDUCTING PROPERTIES OF RARE-EARTH METALS AND COMPOUNDS.
Interim scientific rept. no. 3, 1 June 61-15 May 62,
by J. F. Miller, F. J. Reid and others.
1 June 62, 40p. incl. illus. tables, refs.
(Contract AF 33(616)7321)
Unclassified report

DESCRIPTORS: *Semiconductors, *Rare earth compounds, *Rare earth elements, *Selenides, *Tellurides, *Gadolinium compounds, *Neodymium compounds, Electrical properties, Physical properties, Single crystals, Crystals, Growth, Crystal structure, Thermoelectricity, Purification, Samarium, Arsenides, Cerium compounds, Ytterbium compounds, Strontium compounds, Intermetallic compounds, Alloys, Preparation, Rare earth compounds.

Various methods for the growth of crystals of rare-earth selenides, tellurides, and arsenides were investigated. Sm metal was purified by distillation and subsequent condensation as a solid. Analysis of crystal-structure data for the Nd, Gd, and Er sesquiselenides and sesquitellurides indicates that the Th_3P_4 structure becomes unstable at anion-cation radius ratios above 2.2. Electrical-property studies indicate that, in the Nd-Te and Gd-Te systems, the MX and M_3X_4 compositions resemble metals and semimetals, while properties of the M_2X_3 compositions are similar to those of typical semiconductors. The monoselenides and monotellurides of Sm and Yb have apparently intrinsic high-negative temperature coefficients of resistance. Room-temperature resistivity and the activation energy for conduction in SmSe were 2000 ohm-cm and 0.7 ev, respectively. Specimens with room-temperature resistivities ranging from 3700 to 10 to the -4th power ohm-cm were prepared by alloying high-resistivity YbSe with low-resistivity NdSe. (Author)

AD-278 373 Div. 25
(TISTP/TL) OTS price $3.60

Brown U., Providence, R. I.
THE EFFECT OF A STANDING SOUND FIELD ON A SLOW STREAM DISCHARGED FROM A POROUS WALL.
Interim technical rept. on Research on Aerodynamic Flow Fields,
by J. Kestin and L. N. Persen. Dec 61, 25p. incl. illus. 5 refs.
(Contract AF 33(616)7749, Proj. 7064)
(ARL-169 pt. 1) Unclassified report

DESCRIPTORS: *Sound, *Fluid flow, *Cylindrical bodies, *Acoustics, *Smokes, Convection, Propagation, Pressure, Velocity, Measurement, Photographic analysis.

The flow pattern which results when a stationary sound field is created outside an infinite plane wall through which a fluid is slowly discharged is discussed. It is shown that the field can be obtained as a simple superposition of the secondary flow field calculated by H. Schlichting and the velocity of discharge. Flow patterns are sketched and one of them is compared with a photograph obtained by R. M. Fand and J. Kaye under sufficiently similar conditions. The agreement between the two patterns is very satisfactory. (Author)

AD-278 375 Div. 25, 8
(TISTP/WH) OTS price $2.60

Boeing Scientific Research Labs., Seattle, Wash.
INJECTED PLASMAS IN INDIUM ANTIMONIDE IN THE PRESENCE OF LONGITUDINAL MAGNETIC FIELDS,
by Betsy Ancker-Johnson. June 62, 18p. incl. illus. tables, 9 refs. (Document no. D1-82-0172)
Unclassified report

Also available from the author.

DESCRIPTORS: *Intermetallic compounds, *Indium alloys, *Antimony alloys, *Plasma physics, *Magnetic fields, Plasma oscillations.

The properties of injected electron-hole plasmas were investigated as a function of current I, electric field strength E, and longitudinal magnetic field strength B. A boundary in E-B space exists below which the plasma density remains essentially equal to the density obtained in the absence of an external magnetic field. In the regime B is greater than B (critical) above the boundary the plasma is strongly dissipated. Oscillations occur in the subcritical regime only for high currents, I is greater than I (pinch). These pinch-unpinch oscillations have a nonreproducible waveform. Very reproducible oscillations are observed in the supercritical regime and their thresh hold frequencies have been measured. The data are compared to the predictions of the hydromagnetic screw instability theory. Agreement is found for the dependence of the critical electric field strengths and the threshold frequencies on the critical magnetic field strengths.

A preliminary study in 2N H2SO4 indicates that the electrical behavior for passive Ni is more complicated than that for Fe. With a Ni electrode in solution the open-circuit potential is -0.74 v. With the circuit closed and the potential 0.5 ma flows which remains constant for 1 or 2 min and then starts to increase. The increase accelerates with time until a maximum of 66 ma is reached in about 10 min. With the current above 1 ma, etching becomes visible as pitting, the pits growing in diameter and having a direct effect on the current. Some resistive layer was being removed as the current increased. The Ni system could be cycled, passivated readily, and recleaned.

AD-278 221 Div. 25
(TISTP/TL) OTS price $5.60

Digital Computer Lab., U. of Illinois, Urbana.
NUMERICAL ESTIMATION OF THE PARTITION FUNCTION IN QUANTUM STATISTICS,
by Lloyd D. Fosdick. 1962, 47p. incl. illus. tables, 10 refs. (Rept. no. 118)
Unclassified report

DESCRIPTORS: *Quantum statistics, *Topology, *Numerical methods and procedures, *Integrals, *Number theory, *Probability, *Groups (Mathematics), Harmonic oscillators, Errors, Statistical processes, Statistical distributions, Particles, Sequences.

A method for estimating the partition function of a quantum mechanical system is described. The method is based on a technique for evaluating the Wiener integrals in terms of which the partition function may be expressed. This technique involves first, an approximation of the Wiener integral by an n-dimensional integral and, second, a Monte Carlo estimation of the value of the n-dimensional integral. Application of the method to a harmonic oscillator and a pair of interacting particles in a box in two dimensions is described. (Author)

AD-278 246 Div. 25, 17
(TISTM/EJH) OTS price $4.60

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
FIELD EMISSION MICROSCOPY OF Re-Mo ALLOYS AND STUDIES OF FIELD INDUCED SURFACE REACTIONS.
Final rept., 1 Mar 61-28 Feb 62,
by E. W. Muller. 31 Mar 62, 37p. incl. illus. 14 refs.
(Contract AF 19(604)8336, Proj. 6694)
(AFCRL-62-473) Unclassified report

DESCRIPTORS: *Thermionic emission, *Field emission, *Microscopy, *Cathodes (Electron tubes), *Rhenium alloys, *Molybdenum alloys, Lattices, Surfaces, Crystal structure, Chemical reactions, Platinum, Electric fields, Mass spectroscopy, Carbon compounds, Monoxides, Nitrogen, Adsorption, Oxygen, Surface properties.

Field emission microscope patterns were obtained from 35 atom % Re-Mo alloy, showing a bcc lattice, and of more than 50 atom % alloy, showing sigma phase. A bcc phase twin crystal boundary was observed in a 112 plane, with (111) as the twinning direction. Adsorption of Zr and Th on the bcc phase and of O on the sigma phase was studied. Field ion microscopy of solute alloys gives no detailed results as field evaporation causes the development of atomically random surfaces. A fast scanning limited resolution mass spectrometer was developed which will be suitable for analyzing transient field desorption products. Double charged ions of W, Mo, and WO3 were observed. Field induced reactions between W, Mo or Pt with Co and N were observed to occur in a field ion microscope at fields up to 450 MV/cm and at temperatures down to 20 K, simultaneously with the rearrangement of metal atoms in the surface. (Author)

AD-278 248 Div. 25
(TISTP/WH) OTS price $5.60

Washington U., St. Louis, Mo.
THE STATISTICAL THEORY OF CONDENSATION.
Master's thesis,
by Ching-Tang Chen-Tsai. July 62, 46p. incl. illus. 16 refs. (Technical rept. no. 3)
(Contract AF 49(638)834)
(AFOSR-2662) Unclassified report

DESCRIPTORS: *Condensation, *Water, *Theory, Kinetic theory, Statistical processes.

The statistical theory of the condensation of water is treated. Efforts are made to clarify the significant role the interaction potential between particles plays on the condensation phenomenon, and to attain plausibility in mathematical arguments. In Chapter II, Mayer's theory of imperfect gases is recapitulated, and some reasonable assumptions on the pressure vs specific volume curves in the region of validity of the theory are made. In Chapter III, general properties of the pressure vs specific volume curves are discussed. By using the grand canonical ensemble method the characteristic phenomenon of condensation is mathematically derived in Chapter IV. Chapter V presents an exact mathematical treatment of the Einstein condensation to illustrate the proper limiting process of the series expressions of thermodynamic functions for infinite systems. (Author)

AD-278 260 Div. 25
(TISTP/FR) OTS price $1.60

Rochester U., N. Y.
THEORETICAL STUDIES OF EFFECTS OF COHERENCE IN ELECTROMAGNETIC RADIATION.
Final rept.,
by Emil Wolf. May 62, 19p.
(Contract AF 49(638)602)
(AFOSR-2656) Unclassified report

DESCRIPTORS: *Optics, *Light, Photons, Electromagnetic fields, Bibliography.

The investigations may be grouped under the following headings: Coherence properties of electromagnetic radiation; Properties of photon beams; Diffraction and related investigations; and Surveys of current research on coherence and fluctuations. (Author)

AD-278 280 Div. 25
(TISTP/TL) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
TWO VERIFICATIONS OF THE KARAL-KELLER THEORY OF WAVE PROPAGATION,
by H. A. Lang. 8 June 62, 15p. 4 refs. (Rept. no. TDR-930(2270-40)TN-1)
(Contract AF 04(647)930)
(DCAS TDR 62-128) Unclassified report

DESCRIPTORS: *Electromagnetic waves, *Propagation, Vector analysis, Diffraction, Fourier analysis, Synthesis, Series.

The Karal-Keller theory is applied to an explosive source in a spherical cavity where it becomes exact because the displacement series terminates after two terms. This solves the source problem as a necessary preliminary to considering

AD-278 135 Div. 26, 15
(TISTP/GRW) OTS price $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
INDIRECT PARAMETER ESTIMATION,
by N. Kaufman. 27 Apr 62, 9p. incl. illus.
(Rept. no. 6301-6221-RU-000)
(Contract AF 04(694)3)
(BSD TDR 62-73) Unclassified report

DESCRIPTORS: *Operations research, *Scheduling, Maintenance, Statistical analysis.

Inferential methods are presented which can be used to estimate the values of some of the parameters associated with mathematical models of alert readiness. These inferential methods are based upon perturbations of the basic time line sequence of events of the model. (Author)

AD-278 193 Div. 26, 17
(TISTM/JSM) OTS price $.75

Defense Metals Information Center, Columbus, Ohio.
BRAZING AND BONDING OF COLUMBIUM, MOLYBDENUM, TANTALUM, TUNGSTEN, AND GRAPHITE,
by H. E. Pattee and R. M. Evans. 11 June 62, 21p. incl. tables, 23 refs. (DMIC memo. no. 153)
(Contract AF 33(616)7747, Proj. 2(8-8975))
Unclassified report

DESCRIPTORS: *Brazing, *Bonding, *Niobium, *Molybdenum, *Tantalum, *Tungsten, *Graphite, Refractory materials, Diffusion, Soldering, Solid state physics, Binders, Niobium alloys, Spaceships, Space weapons, Metals, Alloys.

Many of the important developments in the joining of columbium, molybdenum, tantalum, tungsten, and graphite are summarized. Much of the subject matter is devoted to the brazing processes, but diffusion and solid-state bonding are covered also. The particular properties which recommend the refractory metals and graphite to aerospace applications are discussed. Adverse properties which limit the use of these materials or which must be overcome by using special precautions also are mentioned. Typical filler metals used to join the refractory materials for low- as well as high-temperature service conditions are covered. The information was gathered from the current literature on joining and from the open DMIC files. (Author)

27. PROPULSION SYSTEMS

AD-278 273 Div. 27, 10
(TISTA/GEC) OTS price $1.60

Naval Ordnance Test Station, China Lake, Calif.
TECHNICAL RECOMMENDATIONS FOR THE IGNITION RESEARCH PROGRAM OF THE BUREAU OF NAVAL WEAPONS,
by E. W. Price. June 62, 20p. (NOTS TP 2947)
(NAVWEPS rept. no. 7923)
Unclassified report

DESCRIPTORS: *Ignition, Research program administration, Theory, Ballistics, Feasibility studies, Solid rocket propellants, Test methods, Materials, Rocket motors, Rocket igniters.

Technical recommendations are presented for an integrated program of research on solid propellant rocket ignition. Through considerations of the technical aspects of ignition, the practical goals of the research program, and the administrative problems of managing an integrated program, the recommended research was divided into six categories, Relative Importance Studies, Ballistic Theory and Tests, Fundamental Ignition Research, Ignition Materials Research, Materials Processing and Laboratory Services, and Feasibility Studies. (Author)

AD-278 277 Div. 27, 17, 30
(TISTM/SEB) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
TUNGSTEN AND ROCKET MOTORS.
Final rept.,
by G. M. Gordon and D. A. Brown. 31 May 62, 62p. incl. illus. table, 6 refs.
(Contract NOrd-18619)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Tungsten, Shock, Erosion, Rocket motors, Exhaust gases, High temperature research, Test methods, Simulation, Stresses, Elasticity, Tensile properties, Temperature, Fracture (Mechanics), Gas flow, Plasma jets, Solid rocket propellants, Thermal stresses.

Thermal shock and erosion characteristics of tungsten were studied under simulated solid propellant nozzle conditions. The erosion of tungsten was investigated in a high velocity plasma as a function of exhaust component (CO_2 and Al_2O_3), temperature (2800 to 3350 C), component flux, and type of tungsten. The tungsten erosion mechanism in CO_2 was found to be the formation and volatilization of tungsten oxide. The erosion rate was principally dependent upon the incident CO_2 gas flux and relatively insensitive to surface temperature and type of tungsten. Thermal shock tests in a specially constructed apparatus were performed on a series of hollow tungsten and ceramic cylinders. A method for determining the maximum thermal stresses was devised which requires only measuring the outer surface temperature and strain, and a knowledge of the elastic constants up to the ductile-brittle transition temperature of the tungsten cylinder. A relationship between rate of rise of mean specimen temperature, outer surface strain rate, and specimen dimensions was developed and a preliminary experimental verification was obtained. Thermal shock cracks were produced and crack orientation was correlated with the ratio of cylinder height to outside diameter. (Author)

AD-278 371 Div. 27, 14
(TISTM/EJH) OTS price $5.60

Atlantic Research Corp., Alexandria, Va.
IMPROVEMENT OF THE USEFULNESS OF PYROLYTIC GRAPHITE IN ROCKET MOTOR APPLICATIONS.
Annual technical summary rept. no. 2,
by James D. Batchelor, Edwin F. Ford, and Eugene L. Olcott. June 62, 50p. incl. illus. tables.
(Contract DA 36-034-ORD-3279, Proj. TB4-004)
Unclassified report

DESCRIPTORS: *Rocket motor nozzles, *Rocket motors, *Graphite, *Refractory coatings, Coatings, Carbon deposits, Pyrolysis, Hydrocarbons, Manufacturing methods, Microstructure, Erosion, Test methods, Configuration, Design, Theory, Stresses, Refractory materials.

Work on the application of pyrolytic graphite in high performance solid propellant motors is described. Studies of the deposition process variables continued with emphasis on methods of improving the microstructure of coatings formed at

Qualitative agreement requires that the diameter of the injected plasma column be more than an order of magnitude smaller than the transverse dimensions of the sample. Some results are noted which are inexplicable on the basis of the screw instability theory. (Author)

AD-278 377 Div. 25
(TISTM/EJH) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
GRAIN-BOUNDARY DIFFUSION OF GOLD IN COPPER,
by A. E. Austin and N. A. Richard. 1962, 8p. illus. tables, 9 refs.
(Grant AFOSR 61-107)
(AFOSR-3013)
Unclassified report

DESCRIPTORS: *Gold, *Copper, *Diffusion, *Lattices, Atoms, Crystals, Gold plating, Electroplating, Grains (Metallurgy), Theory, Solid state physics, Metals.

The diffusion of Au into the grain boundaries of Cu bicrystals was studied for couples of both a continuous and an instantaneous source. The concentration contours along the grain boundaries were measured by means of electron-probe microanalysis. For the continuous source conditions at 750 C, the ratio of the coefficients of grain-boundary diffusion and lattice diffusion decreased from 6 x 10 to the 5th power to about 10 to the 3rd power with increasing Au concentration from 0.5 to 15 atom % Au. The rate of grain-boundary diffusion decreases even though there is some increase in the rate of lattice diffusion. There was found some contribution of surface diffusion to the couples with an instantaneous or thin source, i.e., 0.5 micron thick. The concentration contours observed in these couples agreed generally with the theoretical solutions. (Author)

AD-278 380 Div. 25
(TISTP/TL) OTS price $1.60

Copenhagen U. (Denmark).
WEAK INTERACTION MODEL FOR DISSOCIATION OF DIATOMIC MOLECULES,
by Knud Andersen and Thor A. Bak. 30 Mar 62, 14p. incl. illus. 11 refs. (Technical note no. 6)
(Contract AF 61(052)133)
(ARL 62-384) Unclassified report

DESCRIPTORS: *Gases, *Molecules, *Dissociation, *Chemical reactions, *Iodine compounds, *Argon, Recombination reactions, Taylor's series, Integration, Potential theory, Kinetic theory, Harmonic analysis, Heat transfer, Energy.

Calculations of the absolute values of the rate constants for the gas phase reaction A2 + M is in equilibrium with 2A + M are performed, assuming a weak interaction between the diatomic molecule A2 and the inert gas M. The potential in the diatomic molecule is assumed to be a cut-off harmonic potential, and the potential between the two ends of the diatomic molecule and the gas atoms is assumed to be the attractive part of a Lennard-Jones 6-12 potential. It is found that the rate constants calculated in this way are far too small, and that they have an incorrect mass dependence. It is concluded that the weak interaction must play a negligible role for chemical dissociation reactions in the gas phase. (Author)

26. PRODUCTION AND MANAGEMENT

AD-278 010 Div. 26, 17, 27
(TISTM/JSM) OTS price $1.10

Rolla Metallurgy Research Center, Bureau of Mines, Mo.
VAPOR DEPOSITION OF TUNGSTEN AND THE EFFECTS OF PROCESS VARIABLES.
Summary rept. for Research for period ending 30 June 62,
by F. W. Hoertel. 30 June 62, 8p.
Unclassified report

DESCRIPTORS: *Tungsten, *Vapor plating, Metal coatings, Rocket motor nozzles, Tungsten compounds, Fluorides, Beryllium compounds, Oxides, Microstructure, Grains (Metallurgy), Hardness, Hydrogen, Physical properties, Bonding, Chemical impurities.

Activities were to include research into the vapor deposition of tungsten on Polaris nozzle components and variables of W vapor deposition. A 0.06-in. coating of high-purity W was to be vapor deposited from tungsten hexafluoride onto a tungsten-beryllia MERM nozzle insert and 4 standard graphite test nozzle inserts. Cylinders deposited at different temperatures under atmospheric pressure and constant ratio and flow rate of reactant gases showed: (1) metallic impurities in the deposited metal between 16 and 56 ppm, the major impurity being 4 to 19 ppm of Si; and (2) columnar microstructures for the deposits, increased grain size, and a decrease in Knoop microhardness values from 475 to 600 C and then a constant value through 700 C. Other experimentation included investigations into (1) changes in physical properties of deposits produced by reactant-gas mixtures having different ratios of H and tungsten hexafluoride, (2) changes in physical properties of W vapor deposited with reaction chamber pressures equivalent to 3 to 7 in. of H_2O, (3) the preferential removal of impurities present in commercially prepared tungsten hexafluoride, and (4) the bonding characteristics of W vapor deposited on various substrate materials.

AD-278 105 Div. 26, 15
(TISTP/GRW) OTS price $5.60

International Business Machines Corp., San Jose, Calif.
APPROXIMATE METHODS FOR TIME-DEPENDENT GAS FILM LUBRICATION PROBLEMS,
by W. A. Michael. 1 May 62, 50p. illus. 13 refs.
(Research rept. no. RJ-205)
(Contract Nonr-344800)
Unclassified report

DESCRIPTORS: *Gas bearings, *Pressure, *Laminar boundary layer, *Numerical methods and procedures, Nonlinear systems, Partial differential equations, Difference equations.

The pressure in a thin film of gas undergoing laminar, isothermal flow is given by the so-called Reynolds equation, a nonlinear second order partial differential equation of parabolic type. The Reynolds equation plays a central role in the theory of gas film lubrication. A study was made of numerical procedures based upon finite differences for obtaining approximate solutions. A number of explicit, semi-explicit, and implicit difference schemes are examined from the point of view of truncation error, stability, and computational efficiency. (Author)

AD-277 972 Div. 29
(TISTB/AW) OTS price $1.60

Army Arctic Test Board, Fort Greely, Alaska.
EVALUATION OF HEATING DEVICES FOR THE QUICK-SERVE MEALS.
18 June 62, 18p. incl. illus. tables (Proj. ATB 3-202-1)

Unclassified report

DESCRIPTORS: *Water heaters, *Military rations, Tests, Effectiveness, Arctic regions, Heating, Heat treatment, Water, Boiling, Combat, Logistics.

Neither of the test heaters provided for evaluation would consistently boil the quantity of water required for the 6-man module of the Quick-Serve Meal. In the case of the test carbon heater, a large percentage failed in this regard, and the carbon heaters that did boil water required an excessive period of time. The test modular combustion heater was heavy, bulky and required draining prior to transport. The test modular combustion heater appeared too costly to be considered expendable, yet not durable, reliable, or flexible enough to be considered as a class II item of equipment. Of the other stoves examined, only the Yukon Stove approached acceptability. From a weight, bulk and fuel consumption viewpoint, use of the item would be prohibitive unless transported for its primary application of heating shelters. An efficient, lightweight device must be provided before the Quick-Serve Meal can be effectively employed in cold weather. (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-277 952 Div. 30
(TISTA/SEB) OTS price $1.60

Aeronautical Research Lab., Office of Aerospace Research, Wright-Patterson Air Force Base, Ohio.
ESTIMATED PERFORMANCE CHARACTERISTICS OF THE ARL 30-INCH HYPERSONIC WIND TUNNEL AT M 18.
Rept. for July-Aug 61, on Research on Aerodynamic Flow Fields,
by George Luthringer. Nov 61, 14p. incl. illus. 4 refs. (Rept. no. ARL-176)
(Proj. 7064)

Unclassified report

DESCRIPTORS: *Hypersonic wind tunnels, *Wind tunnel nozzles, Gas flow, Shock waves, Pressure, Hypersonics, Mathematical analysis, Mathematical prediction, Tables.

Predicted values of the important performance parameters for the Aeronautical Research Laboratory's new 30-inch (nozzle exit diameter) hypersonic wind tunnel are discussed. Included are curves giving tunnel Reynold's numbers per unit length, flight Reynold's number (with simulation capability indicated), degrees supersaturation, mass flow rates, normal shock recovery pressures, vacuum system characteristics, and running times. (Author)

AD-277 978 Div. 30, 1, 14
(TISTM/TCG) OTS price $.75

Colorado U., Boulder.
RESEARCH ON HEATER-TENSION PADS AND HIGH TEMPERATURE HEATERS. PART I - EVALUATION OF HEATER-TENSION PADS AT 500 F.
Interim rept. on Part 1,
by Frank C. Walz. Apr 62, 22p. incl. illus. tables.
(Contract AF 33(616)6810, Proj. 1347)
(ASD TDR 62-174, pt. 1)

Unclassified report

DESCRIPTORS: *Microfilm, *Heaters, Reliability, Conductivity, Thermal conductivity, Fluorides, Elastomers, Silicones, Resin adhesives, Rubber adhesives, Phenolic resins, Epoxy resins, Honeycomb cores, Structures, Sandwich construction.

Two hundred fourteen 120-volt 5-kilowatt per sq ft micro-film heaters for operation to 600 F were built for heater reliability studies and for use in heater-tension pad tests. This micro-film heater proved to be robust and sufficiently reliable for applications to large scale testing. The procedures for constructing 500 F, 20 psi heater-tension pads employing a silicone rubber and phenolic-epoxy adhesives were established. Endurance tests indicate a high degree of reliability. Success in building heater-tension pads utilizing a fluorinated elastomer Viton for operation at 600 F and 20 psi was delayed by difficulties in bonding to the Viton. However, the availability of thicker and sponged Viton suggests that this problem can now be solved. Tests made on the temperature distribution of honey-comb structures indicate that the desired degree of uniformity can be attained. (Author)

AD-277 979 Div. 30, 1, 14, 17
(TISTM/EJH) OTS price $1.25

Colorado U., Boulder.
RESEARCH ON HEATER-TENSION PADS AND HIGH TEMPERATURE HEATERS. PART II - RESEARCH ON MATERIALS FOR HIGH TEMPERATURE CONDUCTION HEATERS.
Final rept.,
by Frank C. Walz. Apr 62, 42p. incl. illus. 23 refs.
(Contract AF 33(616)6810, Proj. 1347)
(ASD TDR 62-174, pt. 2)

Unclassified report

DESCRIPTORS: *Microfilm, *Heaters, *Aerodynamic heating, Honeycomb cores, Sandwich construction, Materials, Thin films, Dielectrics, Dielectric films, Metallic compounds, Oxides, Aluminum compounds, Nickel alloys, Chromium alloys, Adhesives, Bonding, Manufacturing methods, Vapor plating, Glow discharges, Cleaning, Surfaces, Test equipment, Test methods, Airframes, Structures, High temperature research, Simulation.

Research work performed in the development of a micro-film heater for operation at high temperatures is discussed. The combination of nickel leads, gold tabs and a Nichrome heater film on an aluminum oxide dielectric was found to be compatible for operation as a micro-film heater to 1500 F. Other materials for 2000 F operation are under study. Three methods of forming smooth, thin film dielectric substrates are under investigation. The addition of fillers to several of the adhesives studies to date show promise for attaching the terminal leads to terminal tabs and for attaching the type of tension pad envisioned. (Author)

AD-278 034 Div. 30, 18
(TISTP/FR) OTS price $6.60

Technical Operations, Inc., Washington, D. C.
PHASES IN THE PLANNING AND PREPARATION OF INPUTS FOR THE AIR BATTLE MODEL II.

lower deposition temperatures. A substrate pretreatment consisting of a furane resin impregnation shows promise. Emphasis was placed on the measurement of the erosion rate of nozzles coated with a standard (2000 C) grade of pyrolytic graphite in rocket motor firings. For propellants with flame temperatures of 5600 and 6000 F, the erosion rate was very low. With a 6500 F propellant, erosion increased with increasing motor pressure and reached a rate near 0.5 mil/sec at about 900 psi. This indicates clearly the utility of pyrolytic graphite for solid propellant rocket nozzles. Mechanical design and stress analysis calculations were made; based on these, the utility of segmented nozzle designs was substantiated. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-278 190 Div. 28
(TISTB/AW) OTS price $8.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
HUMAN OPERATOR TRANSFER FUNCTION INVESTIGATION,
by Grady J. Eakin and Graham F. Campbell.
1 Oct 57, 99p. incl. illus. tables, 6 refs.
(Rept. no. TE-665-F-5)
(Contract AF 33(038)9200)
Unclassified report

DESCRIPTORS: *Human engineering, Pilots, Control, Handling, Stability, Control sticks, Effectiveness, Functions, Aircraft.

The phase and amplitude ratio of the transfer function used by a pilot in flying an aircraft with several different handling characteristics was obtained from flight test data. The transfer function obtained relates aircraft pitch angles (as the input to the pilot) to stick force (as the output of the pilot). This data was obtained during flight tests of an artificially stabilized F-94A aircraft. During the flight tests, three sets of short period pitch axis aircraft response characteristics were utilized. At each of the three sets of characteristics, several values of stick force per g and stick displacement per g were provided. Pilot transfer functions are presented for all of the combinations of response characteristics and stick force and stick travel per g. (Author)

AD-278 192 Div. 28
(TISTB/AW) OTS price $4.60

Dikewood Corp., Albuquerque, N. Mex.
AN INFORMATION THEORY OF LEARNING FOR COMMUNICATIONS VOL. II - DEVELOPMENT AND TESTS OF A COMMUNICATION THEORY OF LEARNING.
Final rept.
6 Apr 62, 47p. incl. tables, 8 refs. (Rept. no. DFR-1018-2)
(Contract AF 30(602)2391, Proj. 4519)
(RADC TDR 62-255, vol. 2)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: *Learning, *Communications theory, Information theory, Simulation, Games theory, Probability, Design, Theory.

Experimental models that simulate certain aspects of the learning situation were tested. These models were developed to extend and test a theory of learning in communication situations that had been previously developed. Various experiments were performed using a digital computer to simulate the models. These experiments led to the conclusion that the development and testing of acceptance criteria is an essential part of the study of learning processes. Acceptance criteria are those used by a learner in the process of accepting or rejecting hypotheses based on environmental inputs. A distance measure in hypothesis space is discussed as a possible acceptance criterion, and recommendations are made for further study. (Author)

AD-278 397 Div. 28
(TISTB/AW) OTS price $1.60

Operational Applications Office, Air Force Electronic Systems Div., Bedford, Mass.
ABSOLUTE JUDGEMENTS OF VELOCITY,
by George P. Ganem. May 62, 13p. incl. illus. tables, 15 refs.
(ESD TDR 62-37) Unclassified report

DESCRIPTORS: *Psychology, Reasoning, Display systems, Information theory, Video signals, Visual signals, Radar operators.

The maximum amount of information transmitted by observers in the absolute judgment of velocity was determined. The study was subdivided into a series of five experiments in which 2, 4, 7, 10 or 19 sweep velocities of a 4-1/2 inch cathode ray tube--ranging from .70 inches per second to 300 inches per second (3.90 degrees per second to 1688.70 degrees per second of visual angle)--were presented to four subjects who were required to identify the stimuli with numbers ranging from 1 to 19. An informational analysis indicated that as the amount of stimulus information was increased the amount of transmitted information also increased, but at a decreasing rate, until a maximum of 2.23 bits of information was transmitted. Although anchoring effects occurred at both ends of the stimulus continuum, the low velocities were more accurately identified than were the high velocities. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-277 971 Div. 29
(TISTB/AW) OTS price $5.60

Army Arctic Test Board, Fort Greely, Alaska.
ARCTIC PHASE OF CONSOLIDATED (JOINT) ENGINEER/SERVICE TEST OF QUICK-SERVE MEALS.
18 June 62, 55p. incl. illus. tables (Proj. no. ATB 3-202)
Unclassified report

DESCRIPTORS: *Military rations, Arctic regions, Acceptability, Heating, Heat treatment, Boiling, Water, Tests, Combat, Logistics.

Test results indicated an over-all preference for the Quick-Serve Meal over the control 5-in-1 ration and no deficiencies were developed which should preclude adoption at this time. Throughout the test, however, limitations were imposed by the time and effort required to obtain the boiling water for the meal reconstitution. No efficient device was provided for this purpose nor was a suitable heating device for small unit use with the Quick-Serve Meal found within the supply system. The Quick-Serve Meals' strong dependence on an efficient means of boiling water indicates the item, although suitable per se, should not be adopted until a suitable heating device becomes available. (Author)

gated and attempts were made to incorporate such a device into a digital voltmeter system. Since the field was the basic concept around which the rest of the system was to be designed, much time was spent on fundamental investigations into the types of materials available for this application and the design of the proper geometry of the field. Due to the limitations of present day materials and components, the cost of fabricating a field effect voltmeter that will provide analog to digital conversion at rates in excess of 10 mc is so high that it does not seem practical at this time. In addition, the uncertainty of the fabrication of the field and the enormous amount of circuitry required to make the field effective are quite out of line with what could be considered reasonable for a panel type meter. (Author)

AD-278 143 Div. 30
(TISTP/TL) OTS price $1.00

Military Physics Research Lab., U. of Texas, Austin.
LINEAR OPERATORS FOR DATA PROCESSING,
by Ralph E. Lane. May 62, 28p. incl. illus. tables.
(Contract AF 33(616)7994, Proj. 5277)
(ASD TN 61-105) Unclassified report

DESCRIPTORS: *Numerical analysis, *Data processing systems, *Differential equations, *Integration, *Computers, *Applied mathematics, Transformations (Mathematics), Operators (Mathematics), Theory, Numbers, Polynomials, Tables.

A summary is presented of procedures required in the application of linear operator theory to one aspect of systems analysis--namely, the treatment of experimental data, or data processing. Essentially, the procedures described are generalizations of the procedures usually discussed under the title of numerical analysis or the calculus of differences; the generalization consists of revising the various formulas to include any of various kinds or degrees of smoothing to minimize the effects of chance fluctuations, experimental errors, etc., upon the functions which are taken to be representations of the behavior of a system. General formulas are provided from which the user can obtain a wide variety of special formulas for smoothing, interpolating or extrapolating, differentiating, integrating, etc.; a table is given to simplify the use of the general formulas, and a variety of examples is included to illustrate how special formulas are obtained. (Author)

AD-278 158 Div. 30, 7
(TISTE/CDM) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
INDUCTIVE POWER SUPPLY FOR A HOTSHOT-TYPE TUNNEL,
by A. H. Fillers, Jr. July 62, 43p. incl. illus. 6 refs. (AEDC TDR 62-137)
(Contract AF 40(600)1000)
Unclassified report

DESCRIPTORS: *Power supplies, *Hypersonic wind tunnels, *Induction systems, *Generators, Instrumentation, Operation, Calibration, Maintenance, Sodium, Potassium, Handling.

Studies indicated that an inductive power supply would be more economical than a capacitive type. Therefore an inductive system was developed as a drive for the 50-in. hypervelocity tunnel, Hotshot 2, of the von Karman Gas Dynamics Facility. This 5 x 10 to the 6th power joule, inductive-storage power supply uses a unipolar generator with flywheels to charge an air core coil that is discharged by an arc inside an arc chamber. The development and operation of this inductive-storage power supply are given along with a discussion of the equipment and its auxiliaries. (Author)

AD-278 159 Div. 30, 8, 5
(TISTA/WAW) OTS price $2.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
RADIO TELEMETRY OF STAGNATION PRESSURE FROM A WIND TUNNEL MODEL MAGNETICALLY SUPPORTED IN SUPERSONIC FLOW,
by P. L. Clemens. July 62, 20p. incl. illus. 13 refs. (AEDC TDR 62-141)
(Contract AF 40(600)1000)
Unclassified report

Presented at the AIEE Summer General Meeting. June 18-22, 1962, Denver, Colo.

DESCRIPTORS: *Telemetering, *Supersonic wind tunnels, Wind tunnels, Telemetering receivers, Telemetering transmitters, Telemetering antennas, Telemetering data, Frequency modulation, Pressure, Measurement, Calibration, Magnetohydrodynamics, Supersonics, Magnetic fields, Design, Instrumentation.

During a set of aerodynamic tests in a Mach number 2.4 wind tunnel, it was proven feasible to telemeter stagnation pressure measurements from within a magnetically suspended, ferromagnetic model. State-of-the-art, f-m radio telemetry, developed for hypervelocity range use, was employed. Although data at the outset of each of three trials reflect errors of less than three percent, inordinate frequency vs temperature interactions introduced intolerable shifts in telemeter center frequency as testing progressed. Several methods may be used to reduce these interactions. Magnetogasdynamic effects arising from the use of the magnetic model suspension technique are discussed, and are shown to be negligible in most wind tunnel testing. (Author)

AD-278 282 Div. 30
(TISTE/CAM) OTS price $1.60

Weston Instruments Div., Daystrom, Inc., Newark, N. J.
PRODUCTION ENGINEERING MEASURE FOR RUGGEDIZED TAUT BAND SUSPENSION PANEL METERS PER SIGNAL CORPS TECHNICAL REQUIREMENTS SCS-43A.
Quarterly progress rept. no. 4, 1 Jan-31 Mar 62. 31 Mar 62, 10p.
(Contract DA 36-039-sc-85952)
Unclassified report

DESCRIPTORS: *Meters, *Springs, Magnetic properties, Electrical properties, Mechanical properties, Heat, Thermal stresses, Vibration.

A considerable number of 100, 180 and 250 degree meters were tested. Magnetic, electrical and environmental characteristics were obtained. The results were satisfactory and well within the requirements. The dynamic characteristics of the high sensitivity 100 degree meters have been obtained. This accomplishment was made possible by a unique etching technique which permits fabricating aluminum moving coil frames of one thousandth of an inch. One hundred degree meters were assembled for the purpose of becoming familiar with the construction of ruggedized taut band meters and to obtain manufacturing techniques. Many of the tools and fixtures presently employed on the commerical line of taut band suspension meters can be adapted for the ruggedized line. (Author)

by William Hansen. 12 June 61, 60p. incl. illus. tables (Staff memo. no. 61-3)
(Contract AF 33(600)41896)
Unclassified report

DESCRIPTORS: *Aerial warfare, Combat, Air force operations, Simulation, Digital computers.

A large-scale simulation of a two-sided global air war is discussed. This simulation is performed on an IBM 7090 (formerly an IBM 709) digital computer using a highly specialized program developed by Project OMEGA of Technical Operations, Incorporated. This program, presently called the Air Battle Model II, performs the numerous calculations and bookkeeping functions required for such a simulation. The Air Battle Model II (ABM II) permits the simulation of actions of the first several days of a two-sided global air battle, giving consideration to the aircraft, missiles, weapons, offensive and defensive sites, targets, and plans of both sides. (Author)

AD-278 035 Div. 30
(TISTP/FR) OTS price $2.60

Technical Operations, Inc., Washington, D. C.
USERS AND OPERATORS MANUAL FOR HELPER,
by George A. Westlund. 3 Oct 61, 20p. incl. illus. tables (Rept. no. TR 61-3-2)
(Contract AF 33(600)41896)
Unclassified report

DESCRIPTORS: *Aerial warfare, Combat, Air force operations, Simulation, Digital computers, Programming, Launching sites, Guided missiles, Handbooks.

The 7090 computer program HELPER is described. HELPER is an aid to Air Force personnel who prepare plans for the Omega Missile Battle Models MBM I and MBM II. Given configuration and placement information of missile bases, HELPER provides the user with terrestrial coordinates of installations at each base. It also lists the installations by type and associates each base with a side. Included are instructions for users and operators, descriptions of the input and output, and details of the method of solution and program flow. (Author)

AD-278 036 Div. 30
(TISTP/FR) OTS price $13.00

Technical Operations, Inc., Washington, D. C.
THE TECH/OPS SERIES ON PROGRAMMING SYSTEMS CL-II: A SIMULATION OF THE PROTOTYPE CL-II CONTROL,
by N. W. Johnson. July 61, 181p. incl. illus. tables, 5 refs. (Staff memo. no. 61-6)
(Contract AF 33(600)41896)
Unclassified report

DESCRIPTORS: *Programming, Digital computers. Language.

The control and simulation routines, data sets, and parameters of a prototype control for the CL-II Programming System are precisely described and instructions for setting up games are given. The description and evaluation of a number of games actually run with varying memory length, number of data channels, scheduling rules, and the like are included. The major conclusions reached are: (1) the feasibility of the CL-II control philosophy has been demonstrated; (2) the simulation provides a reasonable vehicle for testing different hardware configurations, scheduling schemes, and the like; (3) the direct conversion and expansion of the prototype control to an operational model is not feasible; (4) the task of producing a running prototype model has generated techniques, ideas, and general 'know how' which would not have been obtained had one plunged into the task of producing an operational model at the outset; and (5) the task of implementing an operational control can be accomplished. (Author)

AD-278 037 Div. 30
(TISTP/FR) OTS price $4.60

Technical Operations, Inc., Washington, D. C.
THE TECH/OPS SERIES ON PROGRAMMING SYSTEMS CL-II: NOTES ON IMPLEMENTATION OF THE CL-II. PROGRAMMING SYSTEM,
by T. E. Cheatham, Jr. July 61, 44p. incl. illus. tables, 9 refs. (Staff memo. no. 61-7)
(Contract AF 33(600)41896)
Unclassified report

DESCRIPTORS: *Programming, Digital computers, Language.

This report contains a series of remarks about the implementation of certain features of the CL-II Programming System. It is not a self-contained document and is intended only for technical personnel involved in the detailed design, implementation, and utilization of the CL-II Programming System. (Author)

AD-278 038 Div. 30
(TISTP/FR) OTS price $8.10

Technical Operations, Inc., Washington, D. C.
THE TECH/OPS SERIES ON PROGRAMMING SYSTEMS CL-II: OPERATIONAL CRITERIA FOR THE CL-II PROGRAMMING SYSTEM,
by G. F. Leonard. July 61, 89p. incl. illus. 10 refs. (Staff memo. no. 61-8)
(Contract AF 33(600)41896)
Unclassified report

DESCRIPTORS: *Programming, Digital computers, Language.

The operational specifications of the CL-II Programming System are presented in sufficient detail to allow comprehension of the ways and means of programming within the system framework. The discussion covers the fundamental concepts of the system, the control scheme, the means of communicating with the system, the initial or basic operations to be provided, and the characteristics of a user's run, while being mainly concerned with the usage criteria of the motivations for and implications of the fundamental aspects of the system. (Author)

AD-278 067 Div. 30, 8
(TISTE/CDM) OTS price $4.60

Contronics, Boston, Mass.
DIGITAL PANEL METER.
Final rept. for period ending 16 July 62. 16 July 62, 32p. incl. illus. table.
(Contract NObsr-85462)
Unclassified report

DESCRIPTORS: *Voltmeters, *Analog-to-digital converters, *Display systems, Digital systems, Miniature electronic equipment, Detection, Costs, Printed circuits, Materials, Packaging, Production, Electronic circuits, Shipborne, Design.

Research was conducted on a high speed, ruggedized, miniature, digital voltmeter utilizing the field effect technique to accomplish analog to digital conversion. The practicality of a field effect analog to digital converter was investi-

AD-[illegible]8 381 Div. 32, 15
(TISTB/MS) OTS price $4.60

Cowles Foundation for Research in Economics, Yale U., New Haven, Conn.
ON A TWO SECTOR MODEL OF GROWTH,
by T. N. Srinivasan. 16 July 62, 46p. (Cowles Foundation discussion paper no. 139; Revision of Cowles Foundation discussion paper no. 139, AD-232 253)
(Contract Nonr-35801, Proj. NR 047-006)
Unclassified report

DESCRIPTORS: *Economics, *Economic conditions, *Mathematical prediction, Statistical analysis, Functions.

AD-278 396 Div. 32
(TISTA/VGW) OTS price $7.60

Operational Applications Office, Air Force Electronic Systems Div., Bedford, Mass.
INTERNATIONAL LANGUAGE FOR AVIATION. A REVIEW OF AIR FORCE SPONSORED RESEARCH FROM 1952 TO 1961,
by Stephen E. Stuntz. Feb 62, 45p. 68 refs.
(Proj. 7686)
(ESD TDR 62-14) Unclassified report

DESCRIPTORS: *Air traffic control systems, *Language, *Psychoacoustics, Voice communication systems, Radio communication systems, Air to air, Air to surface, Aviation safety, Effectiveness, Air force research, Intelligibility.

Research is reported on an international voice radio language for air operations. Part I presents and interprets findings derived from the research and includes pertinent results from other Air Force sponsored sources. Subjects treated include: (1) communication in English with non-native English speakers; (2) comparative effectiveness of International Civil Aviation Organization (ICAO) US-UK phraseologies; (3) operational communication; (4) voice transmission of numerals; (5) basic and theoretical principles; and (6) miscellaneous secondary developments (experimental) techniques, equipment, word lists). (Author)

33. TRANSPORTATION

No Entries

Division 31 - SHIPS AND MARINE EQUIPMENT
Division 32 - MISCELLANEOUS ARTS AND SCIENCES

31. SHIPS AND MARINE EQUIPMENT

AD-278 224 Div. 31
(TISTE/CAM) OTS price $4.60

Norwegian Ship-Model Experiment Tank, Trondheim.
300 TONS, 50 KNOTS HYDROFOILCRAFT.
Rept. no. 2,
by J. K. Lunde and H. AA. Walderhaug. 1962,
49p. incl. illus.
(Contract N62558-2596)
Unclassified report

DESCRIPTORS: *Hydrofoil boats, *Hydrofoils, Ship models, Ship hulls, Model tests, Dynamometers, Hydrodynamics, Motion, Ocean waves, Norway, Test methods, Pitch.

Tests in still water and in regular waves were conducted with the model of a 300 ton - 50 knot hydrofoilcraft. Presented are the results of the still water tests carried out with the model fitted with forward foil no. 7, as well as the results of the complete wave tests. (Author)

AD-278 386 Div. 31, 9
(TISTE/CDM) OTS price $9.10

David Taylor Model Basin, Washington, D. C.
COMPARISON OF THEORY AND EXPERIMENT FOR SLAMMING OF A DUTCH DESTROYER,
by Ralph C. Leibowitz. June 1962, 95p. incl. illus. tables, 65 refs. (Rept. no. 1511)
Unclassified report

DESCRIPTORS: *Destroyers, *Ship hulls, *Impact shock, *Hydrodynamics, Vibration, Motion, Stresses, Theory, Tests, Measurement, Mathematical analysis, Analog computers, Digital computers, Girders, Netherlands.

A theoretical analysis and computation were made of the slamming (hydrodynamic) forces acting on a ship, based upon an experimental knowledge of the ship's rigid-body motions relative to the wave. These forces are considered to be due to the time rate of change of fluid momentum and to buoyancy forces incident to immersion of the hull. In addition, a computation is made of the transient elastic response and associated hull girder stresses of the ship due to the total force exerted by the fluid on the ship. A comparison between the theoretical and measured stresses shows good agreement. Prior investigation has shown that large whipping stresses and motions occur in certain ships subject to slam by hydrodynamic forces. The analysis indicates that the magnitude of these stresses and motions is related to the immersion of the bow flare, whereas the empirical evidence indicates that for rough seas the magnitudes of the whipping stresses, for a ship of given length, are larger for ships with bow flare. For certain ships bow flare may be the most significant single source of hull girder stresses. (Author)

32. MISCELLANEOUS ARTS AND SCIENCES

AD-278 141 Div. 32
(TISTP/FR) OTS price $1.60

System Development Corp., Santa Monica, Calif.
INFORMATION RETRIEVAL AND LINGUISTICS PROJECT.
Progress rept.,
by Harold Borko. 29 Jan 62, 10p. incl. illus.
(Technical memo. no. TM-676)
Unclassified report

DESCRIPTORS: *Information retrieval, Vocabulary, Classification, Abstracting.

Contents:
Associational characteristics of words
Association by concept
Programmed reduction of word-meaning ambiguities
Classification systems
Index evaluation
Abstract effectiveness
Criteria for acceptable abstracts
Automatic abstracting

AD-278 168 Div. 32
(TISTB/MS) OTS price $.50

Engineer Joint Council, New York.
FIRST REVISION OF THE THESAURUS OF ASTIA DESCRIPTORS.
Final rept.
6 Aug 62, 19p.
(Contract AF 18(600)1944)
Unclassified report

DESCRIPTORS: *Documentation, *Indexes, *Subject headings, Dictionaries, Vocabulary, Information retrieval.

This document reports on the creation of a revised Thesaurus of ASTIA Descriptors, carried out under the direction of Engineers Joint Council for ASTIA. The objective was to create for ASTIA an improved indexing and retrieval authority, based upon Edition I of the Thesaurus, and to insure that this authority would be as useful as possible to organizations other than ASTIA. To achieve the objective, it was necessary to review some 7000 existing descriptors (plus ''use'' references) for possible deletion or addition of descriptors, for elimination of synonymous terms, for provision of extensive cross-referencing, for addition of scope notes to those descriptors needing such treatment, and for assignment of descriptors to subject-matter fields-of-interest. To achieve compatibility with other operating systems, it was necessary to call on the advice of dozens of other systems operators and subject-matter specialists -- whose assistance is gratefully acknowledged and detailed in the ''Discussion'' of this report. (Author)

AD-278 226 Div. 32
(TISTP/FR) OTS price $1.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN EXPERIMENTAL STUDY OF BIBLIOGRAPHIC COUPLING BETWEEN TECHNICAL PAPERS,
by M. M. Kessler. 21 Nov 61, rev. 15 June 62,
10p. incl. tables, 3 refs.
(In cooperation with National Science Foundation)
Unclassified report

DESCRIPTORS: *Scientific reports, Documentation, Statistical analysis, Periodicals.

A single item of reference shared by two papers is defined as a unit of coupling between them. Based on this unit, two graded criteria of coupling are defined. These are applied to a test population of papers to generate smaller related groups. The process was tested manually with results that encourage more extensive experimentation. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

*Descriptors marked with an asterik are included in the subject index.

BIBLIOGRAPHY

NASA N62-10370 $18.50

Allied Research Associates, Inc., Boston, Mass.
BIBLIOGRAPHY ON BIOSENSORS, A SAMPLING OF THE WORLD LITERATURE, 1900-1961 (SECOND ADDITION), comp. by J. Healer. Rept. on NASA Contract NASr-16. Jan 62, 295p. 2388 refs. Document ARA-1026, supersedes Document ARA-985.

TID-3314 $2.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
GRAPHITE. A selected bibliography, comp. by Theodore F. Davis. Feb 62, 171p.

ASTRONOMY

NASA N62-14632 $7.60

Iowa State U., Iowa City.
LIFETIMES OF OUTER-ZONE ELECTRONS AND THEIR PRECIPITATION INTO THE ATMOSPHERE, by B. J. O'Brien. Rept. on Contracts NASw-17 and N9onr-93803. [1962] 71p. 34 refs. SUI rept. 62-12.

Astrophysics

NASA N62-10894 $1.10

California U., La Jolla.
METEORITIC DEBRIS FROM THE SOUTHERN CALIFORNIA DESERT, by Kurt Fredriksson and Robert Gowdy. Rept. on NASA Grant NsG-98-60. 1961, 9p. 8 refs.

NASA N62-10371 $1.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
A PROGRAM OF RESEARCH FOR THE DETERMINATION OF RARE-EARTH ELEMENTAL ABUNDANCES IN METEORITES, by J. E. Lasch, A. W. Mosen and others. Quarterly progress rept. for period ending 15 Mar 62, on Contract NASr-75. Mar 62, 20p. 18 refs. GA-2985.

NASA N62-14634 $1.60

Geophysical Inst., U. of Alaska, College.
WARNING SERVICE FOR SOLAR COSMIC RAY EVENTS, by Harold Leinback. Final rept. on NASA Contract NASw-174. 31 Jan 61, 11p. 1 ref.

NASA N62-14633 $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
SOLAR RADIO NOISE. PART I: TYPE II BURSTS, by T. J. M. Boyd. Rept. on NASA Grant NsG-220-62. May 62, 27p. 80 refs. Technical note BN-287.

NASA N62-10818 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
COSMIC RADIATION AND THE K^{40} -- A^{40} "AGES" OF IRON METEORITES, by R. R. Marshall. Rept. on NASA Contract NASw-6. 10 Aug 61, 12p. 37 refs. JPL-TR-32-147.

NASA N62-10559 $1.60

Michigan U., Ann Arbor.
RADIO CHARACTERISTICS OF LUNAR SURFACE MATERIALS, by K. M. Siegel. [Rept. on NASA Grant NsG-4-59] [1961] 11p. 13 refs.

NASA N62-14059 $1.10

Rand Corp., Santa Monica, Calif.
THE ENERGY BUDGET AND ATMOSPHERIC CIRCULATION ON A SYNCHRONOUSLY ROTATING PLANET, by Yale Mintz. Rept. on Contract NAS7-100. July 62, 10p. 7 refs. Memo. RM-3243-JPL.

NASA N62-13526 $2.60

Rand Corp., Santa Monica, Calif.
OPTICAL ELLIPTICITY AND INTERNAL STRUCTURE OF MARS, by D. L. Lamar. Rept. on Contract NAS7-100. June 62, 25p. 26 refs. RM-3127-JPL.

a function of (1) his beliefs about the object and (2) the evaluative aspect of those beliefs, where (1) a belief about an object is described as a relation between that object and any other object or value, and (2) the evaluative aspect of a belief is defined as the attitude toward the object related to the attitude object.

PB 155 319 $15.00

International Business Machines Corp., Kingston, N. Y.
PROGRAM NOTES, LISTINGS, AND FLOW DIAGRAMS FOR HUMAN FACTORS ENGINEERING STUDIES. Research rept. on ECPX-0027, Contract AF 30(635)1404. Nov 60, 225p. AFCCDD-TN-61-29; AD-252 990.

DESCRIPTORS: *Computers, *Display systems, Human engineering, Test equipment, Programming, Design, Tracking, Operation, Circuits, Data processing systems, Radar, Theory, Control systems, Data storage systems, Delay circuits, Control, *Instruction manuals, Radar operators, *Antiaircraft defense systems.

Psychology

PB 159 766 $6.60

California U., Los Angeles.
ADDITIONS TO BIBLIOGRAPHY OF PUBLICATIONS RELATING TO SMALL GROUPS, by Bertram H. Raven. Technical rept. no. 1, supplement no. 4, on Contract Nonr-233(54). 12 May 61, 64p. 1314 refs.

DESCRIPTORS: *Group dynamics, *Bibliography.

See also PB 150 498.

AD-282 853 $2.75

Harvard Medical School, Boston, Mass.
IMAGERY AND SENSORY DEPRIVATION, AN EXPERIMENTAL STUDY, by P. Herbert Leiderman. Rept. 1 Dec 58-15 Dec 61, on Biophysics Research, Contract AF 33(616)6110. May 62, 111p. 54 refs. MRL-TDR-62-28.

DESCRIPTORS: *Sensory deprivations, Hearing, Acoustic images, Optical images, *Behavior, Reaction (Psychology), *Adjustment (Psychology), Stress (Psychology), *Hallucinations, *Psychometrics

The purpose of this research was to evaluate the effect of repeated exposure of the same individual to short periods of sensory deprivation and isolation. Behavioral and physiological responses were measured and their relationship to modification of visual input determined. The results suggest that physiological adaptation to isolation continues over several sessions. The presence of visual imagery in a subject appeared to be related to the individual personality, and not to the conditions of deprivation. Auditory and somesthetic imagery appeared to be related to the type of deprivation. Body movement response was negatively related to the amount of imagery. The findings point up the improtance of non-imagery factors as measures of stress and the importance of assessing individual differences in imagery responses under conditions of isolation. (Author)

PB 160 369 $1.10

Naval Medical Research Inst., Bethesda, Md.
TEMPORAL COURSE OF BEHAVIORAL DISTURBANCE AS A FUNCTION OF DOSE OF ESERINE OR NEOSTIGMINE, by Edward A. Jerome, John P. Flynn, and Thomas J. Connor. Vol. 14, p. 633-640. 1 Oct 56, 8p. 2 refs. Research rept. on Project NM 000 019. 01. 04.

DESCRIPTORS: Drugs, *Physostigmine, Reaction (Psychology), Dosage, *Behavior, *Reaction time, *Learning, Rats.

Albino rats of proven day-to-day stable performance (on an insoluble multiple-choice problem) were given exploratory doses of neostigmine, 0.05 and 0.50 mg/kg., in order to obtain a rough estimate of the range of behavioral impairment. Only the higher dosage allowed reliable detection of behavioral change; depressed activity, not detectable in the first 5 minutes after treatment, occurred 15 minutes after injection and lasted 40 minutes. On this basis the sampling was restricted to the 0.2 to 0.5 mg/kg. range for neostigmine and to the 0.6 to 1.2 mg/kg. range for eserine. This showed that the time required for detecting behavioral disturbance is inversely related to dosage, and prolonged cessation of relevant activity occurred with the two largest dosages of neostigmine, and of eserine. The behavioral correlates of various drug doses, such as amount of impairment, the expected recovery time, the time delay before the drug's effects become manifest, are all obtainable by adjusting this dose selection procedure. (Author)

BIOLOGICAL SCIENCES

PB 160 367 $1.60

Naval Medical Research Inst., Bethesda, Md.
A TAXONOMIC TREATMENT OF THE MOSQUITOES OF UMIAT, ALASKA, by Kenneth L. Knight. Rept. no. 2 on Project NM 005 017. 10 Feb 48, 17p. 6 refs.

DESCRIPTORS: *Classification, *Mosquitoes, *Alaska, Ecology,

A taxonomic study was made of an Arctic-Alaskan collection of reared-associated mosquito specimens. The collection was found to contain the following species: Aedes (Ochlerotatus) punctor (Kirby), A. (Q.) communis (Degeer and A. (Q.) nearcticus Dyar. It is suggested that the specimens of the first species may possibly represent a geographical subspecies. Detailed descriptions of the reared-associated specimens are included. (Author)

NASA N62-13633 $8.60

Rand Corp., Santa Monica, Calif.
STUDIES OF THE PHYSICAL PROPERTIES OF THE MOON AND PLANETS, Quarterly technical progress rept. no. 4 on Contract NASw-6. 30 June 61, 91p. 24 refs. Rept. RM-2817-JPL.

NASA N62-11286 $5.60

Rand Corp., Santa Monica, Calif.
STUDIES OF THE PHYSICAL PROPERTIES OF THE MOON AND PLANETS, by M. H. Davis and S. M. Greenfield. Quarterly technical progress rept. no. 5, 1 July-30 Sep 61, on NASA Contract NASw-6. Sep 61, 56p. 14 refs. Memo. RM-2900-JPL.

NASA N62-13515 $3.60

Rand Corp., Santa Monica, Calif.
VENUS: A CHAPTER FROM ISSLEDOVANIYE FIZICHESKIH USLOVII NA LUNYE I PLANETAKH (INVESTIGATIONS OF THE PHYSICAL CONDITIONS OF THE MOON AND PLANETS). KHARKOV, 1952, by N. P. Barabeshev. Rept. on Contract NAS7-100. June 62, 37p. 23 refs. RM-3194-JPL.

NASA N62-10122 $1.60

Yale U. Observatory, New Haven, Conn.
AN INVESTIGATION TO DETERMINE THE SOLAR PARALLAX UTILIZING MICROWAVE ABSORPTION LINE TECHNIQUES, by A. E. Lilley and Dirk Brouwer. Final rept. 8 May 59-7 May 61, on NASA Grant NsG-8-59. [1961] 12p.

NASA N62-14132 $1.10

Yale U. Observatory, New Haven, Conn.
THE ORBIT AND EPHEMERIS OF PERIODIC COMET OTERMA, by B. G. Marsden. Rept. on Grant NsG-29-60. [1962] 7p. 3 refs.

NASA N62-10119 $3.60

Yerkes Observatory, Williams Bay, Wis.
UPPER ATMOSPHERE OF THE PLANETS, by Joseph W. Chamberlain. [Rept. on NASA Grant NsG-118-61]. [1961] 31p. 24 refs.

BEHAVIORAL SCIENCES

AD-283 343 $0.75

Behavioral Sciences Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio.
SIMULATION TECHNIQUES FOR SPACECREW TRAINING, STATE-OF-THE-ART REVIEW, by Carl F. McNulty. Final rept. on Training Equipment Simulators and Techniques for Air Force Systems. Apr 62, 27p. 19 refs. MRL-TDR-62-32.

DESCRIPTORS: *Space flight, Simulation, *Aviation personnel, Training, Mathematical prediction, *Computers, Display systems, Control systems, Visual perception, Monitors.

The capabilities of the existing simulation technology are discussed and various government and industrial programs for the development of new techniques required for spacecrew training are described. These techniques are divided into categories and discussed in generalities and specifics. The category most basic to the simulation of a system is the development of a suitable set of mathematical models for expressing its characteristics to the degree required. Existing equation techniques are based upon simplifications that are not valid for future type vehicles. Classical equations, although not complete, are too complex to be practical for complete simulation. Programs are discussed for the development of new coordinate schemes and generalized aerodynamic and motion equations. The application of special and general purpose analog and digital computers to simulation problems are discussed, and the development of a real-time digital computer and hybrid analog-digital computers, which appear most promising for future simulation, is reviewed. The requirements for visual capabilities in future training simulation arepresented (Author)

PB 159 694 $6.60

California U., Los Angeles.
AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN BELIEFS ABOUT AN OBJECT AND THE ATTITUDE TOWARD THAT OBJECT, by Martin Fishbein. Doctoral thesis. Technical rept. no. 6 on Dynamics of Social Influence, Contract Nonr-233(54). 1 Mar 61, 67p. 67 refs.

DESCRIPTORS: *Attitudes, *Reasoning, Psychology, *Group dynamics, *Sociology, Dynamics, Behavior, Conditioned reflex, Reflexes, Theses.

This investigation presents a theoretical and methodological approach to the study of the relationship between beliefs about an object and the attitude toward that object. In line with recent theoretical formulations, attitudes are defined as "the evaluative dimension of a concept" and beliefs are defined as "the probability dimension of a concept." Following the principles of behavior theory, a theory of attitude acquisition and a theory of the relationship between beliefs about an object and the attitude toward that object are developed. From the latter theory, it is hypothesized that an individual's attitude toward any object is

PB 160 377 $1.10

Naval Medical Research Inst., Bethesda, Md.
TOLERANCE OF MICE TO GLUTATHIONE SOLUTIONS GIVEN PARENTERALLY, by E. P. Vollmer and M. M. Carey. Vol. 10, p. 579-582. 7 Nov 52, 5p. 3 refs. Research rept. on Project NM 007 081.11.03.

DESCRIPTORS: Drugs, *Glutathione, *Dosage, *Poison tolerance, Potassium tolerance, Radiation injuries, Inhibition.

The tolerance of white Swiss mice for reduced glutathione, dissolved and neutralized in isotonic saline solution, was tested subcutaneously, intraperitoneally and intravaneously. The median lethal doses (LD_{50}) were 8.3, 3.3 and 1.8 grams per kilogram respectively. (Author) (See also PB 160 377)

UR-578 $2.60

Rochester U. School of Medicine and Dentistry, N. Y
BEHAVIORAL CHANGES IN THE PIGEON FOLLOWING INHALATION OF MERCURY VAPOR, by R. D. Armstrong, L. J. Leach and others. Rept. on Contract W-7405-eng-49. 3 July 62, 50p. 7 refs.

AD-283 490 $0.75

St. Louis U. School of Medicine, Mo.
SKIN PULSES AND HEAT TRANSFER, by Kiyoshi Seki, Franz Flath, and Alrick B. Hertzman. Final rept. Mar-Sep 61, on Biophysics of Flight, Contract AF 33(616)707 and Public Health Service Grant H-4936. May 62, 23p. 16 refs. MRL-TDR-62-43.

DESCRIPTORS: *Body temperature, *Skin, *Blood, Calorimeters, Photometers, *Plethysmography, *Heat production (Biology) *Heat transfer, Vasomotor drugs

Calorimetric estimates of cutaneous blood flows in the finger pads, calf and forearm were compared with simultaneous photometric recordings of the skin pulses by photoelectric plethysmographs in these same areas. The amplitude of the skin pulse, expressed as percent decrement in photoelectric current, was related linearly to the blood flow, during cutaneous vasodilatation elicited by body heating and by the local application of a vasodilator drug. Cutaneous blood flow in any skin region of the normal resting subject may be estimated from the relation, blood flow in $cm^3/cm^2/min = 0.2$ A where A is the amplitude of the skin pulse expressed as percent decrement in photoelectric current. (Author)

NASA N62-13733 $5.60

Standard Research Inst. Menlo Park, Calif.
A TRANSDUCER FOR THE CONTINUOUS EXTERNAL MEASUREMENT OF ARTERIAL BLOOD PRESSURE, by G. L. Pressman and P. M. Newgard. Final rept. on NASA Contract NAS-2-515. Dec 61. 60p. 6 refs. SRI Proj. 3604.

NASA N62-10118 $15.50

Stanley Aviation Corp., Denver, Colo.
A STUDY OF THE DYNAMIC MODEL TECHNIQUE IN THE ANALYSIS OF HUMAN TOLERANCE TO ACCELERATION. Rept. on NASA Contract NASr-37. Feb 62, 215p. refs. Document no. 793.

Biochemistry

NASA N62-10408 $1.60

Institute for Space Biosciences, Florida State U., Tallahassee.
EXPERIMENTS RELATED TO THE CHEMICAL ORIGINS OF PROTEIN, by Sidney W. Fox and Kaoru Harada. Rept. on NASA Grant NsG-105-61. [1961] 15p. 53 refs. Contribution no. 1.

PB 160 376 $1.10

Naval Medical Research Inst., Bethesda, Md.
TITRATION CURVES AND ION BINDING ON PROTEINS, NUCLEIC ACIDS, AND OTHER MACROMOLECULES WITH A RANDOM DISTRIBUTION OF BINDING SITES OF SEVERAL TYPES, by Terrell L. Hill. Vol. 14, p. 761-768. 12 Sep 56, 9p. 10 refs. Research rept. on Project NM 000 018.06.53.

DESCRIPTORS: Titration, *Ion exchange, *Proteins, *Nuclein acids, Electrostatic precipitators, Mathematical prediction.

If a macromolecule has several types of sites for the binding of the same ion (e.g., H+), if the sites are known or assumed to be arranged in some regular (one, two, or three dimensional) array but with sites of different types distributed at random in the array, and if electrostatic (or other) effects are taken care of by nearest neighbor interactions, then the theory of the titration or ion binding curve is available from a slight extension of earlier work on the localized unimolecular adsorption of a gas on a heterogeneous surface. Equations are presented which should be useful in the analysis of experimental results when the above model is appropriate. In addition, a table of effective dielectric constants is included which allows estimation of the magnitude of the electrostatic nearest neighbor interaction for charges on the surface of a sphere (in the presence of electrolyte). (Author)

PB 160 364 $1.10

Naval Medical Research Inst., Bethesda, Md.
VARIATIONS IN LIVER GLYCOGEN LEVELS OF INTACT AND ADRENALECTOMIZED MICE, by Joseph J. Martorano. Vol. 15, p. 191-198. 1 Apr 57, 8p. 15 refs. Research rept. on Project NM 007 081.11.09; AD-141 081.

DESCRIPTORS: *Glycogen, *Liver, Excision, *Adrenal glands, Mice.

PB 160 379 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE TOXICOLOGY OF CELLULUBE 220. II. TESTS OF IN VITRO ACTIVITY AGAINST ACETYLCHOLINESTERASE AND HUMAN SERUM ESTERASES, by S. L. Friess. Vol. 14, p. 869-876. 2 Nov 56, 9p. 7 refs. Research rept. on Project NM 005 054.01.02.

DESCRIPTORS: Inhibition, *Cholinesterase, *Phosphates, Esters, *Acetylcholines, Serum, *Cresyl radicals, Toxicity, Drugs, *Esterases, Hydraulic fluids.

The hydraulic fluid called "Cellulube 220, Navy Grade N..4" has been briefly investigated as a possible in vitro inhibitor of true and pseudo cholinesterase. This phosphate ester mixture appears to be without significant inhibitory effect on the true acetylcholinesterase, whether in the purified form or as an aqueous suspension of hemolyzed human red blood cells. It exerts a positive inhibitory effect on human serum cholinesterase (the so-called pseudo cholinesterase), but in contrast to the permanent type inhibition by tri-o-cresyl phosphate this inhibition by Cellulube 220 is rather rapidly reversed in the presence of 10^{-3}M. acetyl choline ion. This regenerative action is consistent with an initial weak interaction between the serum esterase and one or more of the Cellulube components. (Author)

NYO-9644 $6.60

Perkin-Elmer Corp., Norwalk, Conn.
ATOMIC ENERGY COMMISSION BLOOD CELL SCANNER, by N. F. Izzo. Technical rept. no. 2 on Contract AT-(30-1)-2573. 1 Apr 61, 64p.

Anatomy and Physiology

NASA N62-13513 $3.60

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
THE PHYSIOLOGICAL LIMITATIONS OF PERFORMANCE DURING ACCELERATION, by Harold A. Smedal, Terence A. Rogers and others. [1962] 36p. 13 refs.

AD-283 442 $0.50

Biomedical Lab., Aerospace Medical Div., Wright-Patterson AFB, Ohio.
SALT IN SWEAT, by Gordon E. Gibbs. Rept. 17 Sep-1 Oct 61, on Biophysics of Flight. May 62, 7p. 2 refs. MRL-TDR-62-50.

DESCRIPTORS: Secretion, *Perspiration, *Sodium compounds, *Chlorides, *Heat tolerance.

Sweat sodium chloride is elevated in two clinical conditions, cystic fibrosis and adrenocortical deficiency. Cystic fibrosis can occur in some people in a partial form involving the sweat defect but without other symptoms. Because of excessive salt loss from sweating, such individuals are highly susceptible to heat exhaustion of the type produced by prolonged heavy sweating. Sweat sodium chloride was measured in 28 subjects, including members of a thermal duty hazard panel, to determine the incidence of abnormally high sweat levels in otherwise normal individuals. The sweat test used involved stimulation of a local skin area by pilocarpine iontophoresis followed by titration of the chloride in a definite volume of sweat. Sweat volumes ranged from 0.16 to 0.65 gram with an average of 0.37 (SD ± 0.13); chloride concentrations varied from 11 to 58 milliequivalents per liter with an average of 25.4 (SD ± 13.0). These values correspond to those previously reported as within the normal range. (Author)

AD-283 100 $1.50

Michigan U., Ann Arbor.
TRANSMISSION OF THE OCULAR MEDIA, by E. A. Boettner and J. R. Wolter. Rept. 1 Dec 59-1 Dec 61, on Aerospace Systems Personnel Protection, Contract AF 33(616)6847. May 62, 49p. 7 refs. MRL-TDR-62-34.

DESCRIPTORS: *Eye, *Light transmission, Electromagnetic waves, *Cornea, *Crystalline lens, *Vitreous humor, *Ultraviolet radiation, *Infrared radiation, Absorption.

The spectral transmittance of ultraviolet, visible, and near infrared light through the ocular media of humans has been measured. Using freshly enucleated eyes, the transmittances of each component part (cornea, aqueous humor, lens, vitreous humor) were determined for the wavelength range from 0.22 to 2.8 microns. To date 9 eyes have been measured, ranging in age from 4 weeks to 75 years. Two types of measurements were made: the first to measure the total light transmitted (direct and scattered) at each wavelength and the second to measure the percent transmittance of that light passing directly through the various media without absorption or scattering. The results show that: (a) the transmission of ultraviolet radiation decreases with the age of the eye; (b) the transmission of infrared radiation appears to be independent of the age; and (c) the maximum total transmittance of the whole eye, about 81 percent, is obtained in the region from 600 to 850 millimicrons. (Author)

PB 160 366 $1.10

Naval Medical Research Inst., Bethesda, Md.
TABULAR DATA OF THE VELOCITY AND ABSORPTION OF HIGH FREQUENCY SOUND IN MAMMALIAN TISSUES, by D. E. Goldman and T. F. Hueter (Acoustics Lab., Mass. Inst. of Tech). Vol. 13, p. 663-670. 15 Sep 55, 9p. 14 refs. Research rept. on Project NM 004 005.03.08.

DESCRIPTORS: Velocity, High frequency, *Sound, *Tissues (Biology), Acoustics, Absorption, Ultrasonics.

This report is a condensed presentation of currently available data on the velocity and absorption of high frequency sound in mammalian tissues. (Author)

PB 160 372 $1.60

Naval Medical Research Inst., Bethesda, Md.
THERMAL RADIATION BURNS IN RABBITS: II. QUANTITATIVE STUDIES RELATING RADIOACTIVE PHOSPHORUS UPTAKE TO HEALING RATE, by Carleton McKenzie Neil. Vol. 16, p. 519-530. 11 July 58, 12p. 14 refs. Research rept. on Project NM 007 081.03.04.

DESCRIPTORS: *Thermal radiation, *Burns, Rabbits, *Radioactive isotopes, Phosphorus, Absorption, *Healing, Radiation injuries, Dosage.

This report concerns phosphorus changes with time as measured in vivo by P^{32} accumulation after "flash" -type thermal radiation burns of the rabbit ear, with special reference to healing. (See also PB 160 371)

PB 160 373 $2.60

Naval Medical Research Inst., Bethesda, Md.
THERMAL RADIATION BURNS IN RABBITS: III. THE USE OF RADIOACTIVE PHOSPHORUS (P^{32}) TO MEASURE THE SEVERITY OF RADIANT ENERGY BURNS TO THE RABBIT EAR, by C. M. Neil. Vol. 12, p. 695-718. 31 Dec 54, 24p. 18 refs. Research rept. on Project NM 007 081.03.06.

DESCRIPTORS: *Thermal radiation, *Burns, Rabbits, Measurement, *Phosphorus, *Radioactive isotopes, Radiation injuries, Ear.

Twenty adult albino rabbits were subjected to radiant energy burns of a flash type to one ear while under ether anesthesia. The burns were produced by a focussed group of 43 photolamps and were exposed for various durations from 0.2 to 2.4 seconds. Intensity was constant at approximately 7.5 cal sec^{-1} cm^{-2}. Immediately after exposure, each rabbit was injected intracardially with 200 μc of P^{32} as phosphate. Determinations of radioactivity in each ear were done daily by surface counting methods for five days after exposure. The ratio of radioactivity in the exposed ear to that in the control ear for each animal gave the expression Activity Ratio (AR), which averaged for the five day period, gave Severity Ratio (SR). A time plot of all AR's suggested that the value of AR might be related to the gross physical appearance of the exposed tissue. The exposed sites could be grouped on the basis of physical appearance into three groups similar to the classical three degrees of burn. The Sr averages for each group indicated each to be statistically distinct. (Author) (See also PB 160 372)

PB 160 381 $1.60

Naval Medical Research Inst., Bethesda, Md.
TRANSFER OF WATER AND ELECTROLYTES BETWEEN SKIN AND EXTRACELLULAR FLUID FOLLOWING EXTENSIVE EXPERIMENTAL FLASH BURNS, by Mackenzie Walser and Leonard J. Bodenlos. Vol. 12, p. 81-96. 22 Apr 54, 16p. 30 refs. Research rept. on Project NM 007 081.16.02; AD-40 576.

DESCRIPTORS: *Flash burns, *Skin, Pathology, *Body fluids, *Radiation injuries, Electrolytes (Physiology), Burns.

A source of intense thermal radiation (7.5 cal/$cm.^2$-sec.) produced by a battery of photoflood lamps was used to produce flash burns in depilated rats. By rotating the animal in front of this source with a specially constructed device, it was possible to expose 35 percent of the surface area to a thermal "pulse" lasting about 0.7 seconds, causing a deep second degree burn. Groups of animals were sacrificed at 7 intervals from 6 minutes to 48 hours after burning and the electrolyte composition of serum and burned skin was determined. In the skin, fat, water, Na, K, and Cl were determined on a single sample from each animal. Employing certain assumptions, the distribution of water and ions between intracellular and extracellular phases of the skin could be calculated. Skin cell potassium fell immediately, and reached one-third of its normal value within three hours. No replenishment was noted up to 48 hours. No detectable disruption of cell membranes occurred as indicated by the fact that extracellular fluid in the skin never exceeded a value above 16 percent of normal. Sodium placed cellular potassium in equivalent amounts, after three hours. Hyponatremia was greater than could be accounted for by uptake of sodium by the burned cells, indicating transfer of sodium intracellularly in areas remote from the injury. (Author)

PB 160 383 $1.10

Naval Medical Research Inst., Bethesda, Md.
THE TRANSMISSION OF JAPANESE ENCEPHALITIS BY MOSQUITOES AFTER EXPERIMENTAL HIBERNATION, by Herbert S. Hurlbut. Rept. no. 9 on Project NM 005 007. 22 Aug 49, 7p. 7 refs.

DESCRIPTORS: Transmission, *Encephalitis, *Mosquitoes, *Hibernation, Virus infections, Disease carriers.

Female Culex quinquefasciatus were fed an emulsion of mouse brain infected with the virus of Japanese encephalitis and held under conditions simulating hibernation for 66-91 days, including consecutive periods of 5-15 days at 20° - 30° C., 45-82 days at 8° - 13° C. and 3-6 days at 30° C. The surviving mosquitoes transmitted the virus by biting young albino mice after 66, 90 and 91 days, respectively. The mice developed typical Japanese encephalitis and the virus was demonstrated in their brains by bacteria-free passage and by neutralization test. It is concluded that C. quinquefasciatus and other susceptible species of Culex which hibernate as adult females in the temperate zone are probably capable of carrying the virus of Japanese encephalitis through the winter and of transmitting it in the spring by biting susceptible vertebrate hosts. (Author)

Marked variations in individual liver glycogen levels of animals have long been recognized. Although factors such as, age, sex, genetic strain, room temperature, etc., have been reported as contributing factors in this variation, too often these are not considered in the experimental design. Two other factors mentioned in the literature are method of sacrifice and diurnal variation. Since the values for liver glycogen obtained in our laboratory have consistently been higher and less variable than those reported by others it was considered important to reinvestigate the effect of the method and time of sacrifice on liver glycogen levels while controlling other contributing factors. The data obtained in comparing sacrifice of animals by narcosis with that of cervical dislocation indicated that the latter method caused less postmortem glycogenolysis. The difference however was not statistically significant for the number of cases tested. It would appear however to be more practical since it is faster and more economical. More important than the method of sacrifice on the variability of the liver glycogen levels was its hour-to-hour depletion during period that animals were sacrificed even in the presence of abundant food and water. In both intact and adrenalectomized animals the liver glycogen levels decreased as much as 35 percent in 1 hour. It is suggested that in order to minimize variations in liver glycogen levels, the control and experimental animals be sacrificed during the same hour. (Author)

Microbiology

NASA N62-10712 $1.60

Armour Research Foundation, Chicago, Ill.
STUDIES WITH MICROORGANISMS AND PLANTS UNDER SIMULATED MARTIAN ENVIRONMENTS, by E. J. Hawrylewicz and R. Ehrlich. Rept. on NASA Contract NASr-22. [1961] 16p.

NASA N62-14631 $3.60

National Research Corp., Cambridge, Mass.
EFFECTS OF SIMULATED SPACE ENVIRONMENTS ON THE VIABILITY OF MICRO-ORGANISMS, by Norman S. Davis, Gerald Silverman and others. Interim rept. 15 Apr 61-30 Apr 62, on NASA Contract NASr-41. 22 June 62, 33p. 16 refs.

PB 160 362 $1.60

Naval Medical Research Inst., Bethesda, Md.
VISCOSITY STUDIES ON THE ASSOCIATION OF TOBACCO MOSAIC VIRUS IN SOLUTION, by H. K. Schachman. Rept. no. 1 on Project NM 000 002. 29 May 47, 17p. 27 refs.

DESCRIPTORS: *Tobacco mosaic virus, Morphology, *Viscosity, Electron microscopy.

Several physico-chemical methods have been used to demonstrate the tendency of the rod-like particles of tobacco mosaic virus to aggregate. Viscosity measurements, because of their extreme dependence on the asymmetry of molecules, are ideally suited for the investigation of this phenomenon which invariably takes the form of end-to-end aggregation and thus larger and larger axial ratios. The viscosity data obtained on highly aggregated material indicated the existence of the opposite reaction in which the associated particles break up into smaller units approaching that believed to be the fundamental unit. Electron micrographs have yielded supporting evidence to the interpretation of the viscosity studies. Rapidly decreasing values of η_{sp}/C at very low concentrations of virus were observed. An equilibrium between monomer and dimer has been proposed as a possible interpretation for the experimental results. (Author)

TID-16070 $13.50

Purdue U., Lafayette, Ind.
TRICARBOXYLIC ACID CYCLE REACTIONS IN STREPTOMYCES GRISEUS, by Vernon Frank Coty. Doctoral thesis. Sep 53, 184p. 130 refs.

Pathology

PB 160 371 $2.60

Naval Medical Research Inst., Bethesda, Md.
THERMAL RADIATION BURNS IN RABBITS: I. COMPARISON OF EFFECTS OF LARGE AREA EXPOSURES DIFFERING IN TOTAL ENERGY, by David Minard and Roderick E. Jensen. Vol. 10, p. 543-570. 18 Aug 52, 29p. 25 refs. Research rept. on Project NM 007 081.03.03.

DESCRIPTORS: *Thermal radiation, *Burns, Rabbits, *Body surface, Radiation injuries, Dosage, Radiation tolerance.

A source of thermal radiation has been constructed employing forty-three 750 watt reflector photolamps. The maximum intensity at the center of the 4" x 6" aperture is 7.5 cal/cm.^{2}-sec. Shaved albino rabbits anesthetized with vinyl ether were exposed twice, once on each side of the body wall, through the 4" x 6" aperture. Significant changes in plasma volume, blood volume, T-1824 disappearance rate, hematocrit, and plasma proteins were observed two hours post-burn in both burn groups. Sludging and elevated sedimentation rates were also noted after burning. The reduction in plasma volume was found to be significantly greater following the 0.8 second exposure than following the 1.4-1.6 second exposure. An explanation for this difference was the palpably greater edema evident locally in the mild burn. Dye studies indicated that ischemia was immediate in the severe burn whereas it developed gradually as edema appeared in the mild burn. The extent of capillary area sub-totally injured in the mild burn thus appeared to exceed that in the severe burn.

Organic Chemistry

NASA N62-10407 $2.60

Florida State U., Tallahassee.
THE THERMAL COPOLYMERIZATION OF α-AMINO ACIDS, by Sidney W. Fox, Kaoru Harada, and Duane L. Rohlfing. Rept. on NASA Grant NsG-105-61, NIH Grant C-3971, and NSF Grant G-4566. [1961] 23p. 28 refs.

PB 159 827 $6.60

Washington U., Seattle.
SINGLET METHYLENE FROM THERMAL DECOMPOSITION OF DIAZOMETHANE. REACTIONS OF CHEMICALLY ACTIVATED CYCLOPROPANE AND DIMETHYLCYCLOPROPANE MOLECULES, by D. W. Setser and B. S. Rabinovitch. [1962] 66p. 44 refs.

DESCRIPTORS: *Thermochemistry, *Methanes, *Azo radicals, Methyl radicals, Nitrogen, *Propanes, Molecular isomerism, Pyrolysis.

The thermal decomposition of diazomethane (DM) into singlet methylene and nitrogen has been studied from 225° to 450° in 10:1 olefin-diazomethane mixtures. These methylene radicals have similar reactivity to methylene generated from photolytic decomposition of diazomethane as judged by the follow reactions with ethylene and cis-butene-2. The structural isomerization reactions of energized cyclopropane and the structural and geometric isomerization of 1, 2-dimethylcyclopropane, formed from the addition of the thermally generated methylene to the olefins, were measured from 250° to 450° over a wide range of pressures.

Physical Chemistry

NASA N62-13670 $1.10

Armour Research Foundation, Chicago, Ill.
CATALYTIC SURFACE RECOMBINATION OF ATOMIC OXYGEN, by David S. Hacker. Final rept. on NASA Contract NASw-77. 8 Dec 61, 5p. 10 refs. Rept. ARF-4203.

NASA N62-14264 $13.50

Combustion Inst., Pittsburgh, Pa.
NINTH SYMPOSIUM (INTERNATIONAL) ON COMBUSTION, CORNELL UNIVERSITY, ITHACA, N. Y., AUG 27 THROUGH SEP 1, 1962. Abstract of Papers. Rept. on Grants NsG-245-62, NSF G21074, NSF-G21506, and Contract DA-36-034-ORD-3534RD. [1962] 194p. 83 refs.

TID-16292 $3.60

Institute for the Study of Rate Processes, U. of Utah, Salt Lake City.
TRANSIENT ELECTRODE POTENTIALS OF NICKEL, by A. M. Spencer, M. E. Wadsworth, and M. A. Cook. Technical rept. no. 42 on Contract AT(11-1)-1144. 18 May 62, 39p. 29 refs.

NASA N62-11326 $6.60

Isomet Corp., Palisades Park, N. J.
CARBON DIOXIDE REDUCTION SYSTEMS, by Horace W. Chandler, Stanley I. Burghardt and others. Progress rept. no. 4, 15 Sep 60-15 Mar 61, on Contract NASw-117, 1 May 61, 66p. Isomet rept. no. 5007-PR4-61.

NASA N62-12352 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ATOMIC OXYGEN AND NITROGEN DENSITY MEASUREMENTS WITH EPR, by C. A. Barth, A. F. Hildebrand, and M. Patapoff. [1962] 28p. 8 refs.

NASA N62-14021 $1.10

Rennselaer Polytechnic Inst., Troy, N. Y.
FUNDAMENTAL ATOM CHEMISTRY WITH APPLICATIONS TO THE CHEMISTRY OF THE UPPER ATMOSPHERE, by P. Harteck, R. R. Reeves, Jr., and E. W. Albers. Technical status rept. no. 1, 1 July-31 Dec 61, on NASA Grant NsG-158-61. [1962] 3p. 2 refs.

DP-737 $0.50

Savannah River Lab., Aiken, S. C.
DISSOLVING PLUTONIUM METAL IN SULFAMIC ACID, by W. J. Jenkins. Rept. on Contract AT(07-2)-1. July 62, 6p. 2 refs.

PB 160 845 $2.60

TYCO, Inc., Waltham, Mass.
ELECTROCHEMISTRY OF FUEL CELL ELECTRODES, by A. W. Berger. Semi-annual technical summary rept. on Contract NObs-84770. 31 Oct 61, 29p. 5 refs. ARPA Order no. 204-61.

DESCRIPTORS: *Fuel cells, *Electrodes, *Electrochemistry, Intermetallic compounds, Synthesis, Polarization, Electrolytic cells, Electric potential.

A number of intermetallic compounds containing nickel together with an electronegative element from groups from IV-B, V-B, and VI-B, periodic tables, have been synthesized and evaluated as electrode materials. NiAs, NiSb, NiSi and elemental nickel have been studied in N_2, O_2, and H_2 atmospheres in both alkaline and acid perchlorate media. Anodic and cathodic polarization curves have been obtained and partially

PB 160 384 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE TREPONEMAL IMMOBILIZATION TEST IN THE UNITED STATES NAVY, by Robert A. Nelson, F. M. Spofford and others. Vol. 10, p. 921-932. 12 Dec 52, 13p. 17 refs. Research rept. on Project NM 005 048.16.01.

DESCRIPTORS: *Venereal diseases, *Diagnosis, Blood, Test reactions, Antibodies, *Treponema pallidum.

In April 1951 a program was instituted in the U. S. Navy whereby all personnel suspected of having latent syphilis on the basis of a positive standard serological test (reagin test), usually the Kahn flocculation test, were required to have a serum submitted for treponemal immobilization test (TPI test). During the first year of testing, 1224 sera from patients were examined at Naval Medical Research Institute. The incidences of negative TPI tests in patients with positive reagin tests were as follows: 42.5 per cent of 496 untreated patients; 17.6 per cent of 148 patients previously treated because of the positive reagin test; and, 25.0 per cent of 76 patients in whom it was not certain as to whether therapy had been given. The high specificity of the TPI test in previous studies indicates that the patients with negative TPI tests were not syphilitic and that the positive reagin test were false positives.

Pharmacology and Toxicology

AD-282 984 $2.75

Texas A. and M. Research Foundation, College Station.
ENVIRONMENTAL POLLUTION BY MISSILE PROPELLANTS, by Walter W. Heck, Luther S. Bird and others. Rept. Feb-Nov 61, on Toxic Hazards of Propellants and Materials, Contract AF 33(616)7801. Apr 62, 121p. 44 refs. MRL-TDR-62-38.

DESCRIPTORS: Guided missiles, *Propellants, *Toxicity, Aquatic animals, Soils, Bacteria, Fungi, Actinomycetes, Plants, Hydrology, Water supplies, *Contamination.

The effects of 21 missile fuel components, in concentrations of 0, 1, 10, 100, and 1000 ppm, were determined on aquatic organisms (goldfish and Daphnia) soil microflora (bacteria, actinomycetes, and fungi), plants (squash, soybean, cotton, cowpea, and corn) and soils (leachability, runoff, and structure). Some or all of the aquatic organisms died when exposed to 100 ppm of the test chemicals. The same concentration of chemicals had no effect on the counts of soil microflora. Three of the test samples may sterilize the soil of actinomycetes. A concentration of 1000 ppm ppm of two of the compounds and two ionic species produced inhibition of seeding germination. Three of the ionic components, when used as a soil drench at 100 ppm, produced toxic symptoms. When three of the test chemicals (gases) were used at 100 ppm as air pollutants, severe injury or death occurred in all species. Soil analyses were erratic and indicated further research on this problem. Future studies should include the concentration-time relationship of the toxic materials and the absorptive capacities of soil fractions for the test compounds. (Author)

Radiobiology

NASA N62-13807 $3.60

Air Force Cambridge Research Labs., Bedford, Mass.
BRAIN STUDY OF MICE EXPOSED TO COSMIC RAYS IN THE STRATOSPHERE, AND REPORT OF NUCLEAR EMULSION MONITORING IN FOUR BALLOON FLIGHTS FROM BEMIDJI, MINNESOTA, JULY-AUGUST, 1960, by Albert Behar, Richard L. Davis and others. [1962] 40p. 16 refs.

UR-608 $5.60

Rochester U. School of Medicine and Dentistry, N. Y.
THE DISTRIBUTION AND EXCRETION OF ANTIMONY-124 CHLORIDE IN THE RAT FOLLOWING INHALATION, by Dusan Djuric, Robert G. Thomas and Randi Lie. Rept. on Contract W-7401-eng-49. 25 June 62, 54p. 45 refs.

CHEMISTRY

NAA-SR-MEMO-7208 $1.60

Atomics International, Canoga Park, Calif.
LITERATURE SURVEY - URANIUM MONONITRIDE, by W. R. Kerr. 14 Mar 62, 13p. 29 refs.

AD-282 938 $1.75

Isomet Corp., Palisades Park, N. J.
STUDY OF ELECTROLYTIC REDUCTION OF CARBON DIOXIDE, by Horace W. Chandler and Willem Oser. Final rept. 1 Oct 60-30 Sep 61, on Equipment for Life Support in Aerospace, Contract AF 33(616)7349. Mar 62, 60p. MRL-TDR-62-16.

DESCRIPTORS: *Closed cycle ecological systems, *Electrolysis, *Carbon, Reduction, *Controlled atmospheres, Electrolytes, Lithium, Potassium, Carbonates, Yttrium, Lanthanum, Oxides.

NASA N62-13607 $1.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
METHODS USED TO STUDY THE ABSORPTION, REFLECTION AND EMISSION OF INORGANIC SALTS ABOVE AND BELOW THE MELTING POINT, by Jacob Greenberg. 1962, 12p. 11 refs.

K-1359 $1.60

Oak Ridge Gaseous Diffusion Plant, Tenn.
OXYGEN ENRICHMENT OF URANIUM DIOXIDE AND ITS EFFECT UPON HYDROFLUORINATION REACTIVITY, by N. C. Orrick, C. G. Jones, and Karl E. Rapp. Rept. on Contract W-7405-eng-26. 21 Jan 58, declassified 16 Dec 59. 20p. 15 refs.

NASA N62-13994 $2.60

Geological Survey, Washington, D. C.
EXPERIMENTAL HYPERVELOCITY IMPACT CRATERS IN ROCK, by H. J. Moore, D. E. Gault, and R. V. Lugn. Mar 62, 26p. 6 refs.

NASA N62-14085 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DYNAMIC PENETRATION STUDIES IN CRUSHED ROCK UNDER ATMOSPHERIC AND VACUUM CONDITIONS, by David J. Roddy, John B. Rittenhouse, and Ronald F. Scott. Rept. on Contract NAS7-100. 6 Apr 62, 19p. 8 refs. JPL-TR-32-242.

NASA N62-13456 $2.60

Rand Corp., Santa Monica, Calif.
STABILITY OF THE EARTH'S AXIS OF ROTATION AND PHASE CHANGES, by D. L. Lamar and J. W. Kern. Rept. on Contract NAS7-100. June 62, 22p. 18 refs. RM-3124-JPL.

Physics of the Atmosphere

NASA N62-14071 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
CORRECTION FOR ATMOSPHERIC REFRACTION AT THE NASA MINITRACK STATIONS, by F. O. Vonbun. Aug 62, 18p. 17 refs. NASA TN D-1448.

NASA N62-14062 $2.00

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
TIME-DEPENDENT STRUCTURE OF THE UPPER ATMOSPHERE, by Isadore Harris and Wolfgang Priester. July 62, 74p. 40 refs. NASA TN D-1443.

NASA N62-14704 $5.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
OBSERVATIONS OF LARGE SCALE IONOSPHERIC IRREGULARITIES AS DEDUCED FROM SATELLITE INFORMATION, by G. E. Chisholm II. Scientific rept. no. 166 on Satellite Project, NASA Grant NsG-114-61. 1 Aug 62, 55p. 12 refs.

NASA N62-10152 $7.60

Ionosphere Research Lab., Pennsylvania State U., University Park.
STUDIES OF THE EQUATORIAL IONOSPHERE USING THE FARADAY EFFECT ON SATELLITE RADIO TRANSMISSIONS, by L. J. Blumle. Scientific rept. no. 156 on Satellite Project, NASA Grant NsG-114-61. Mar 61, 67p. 18 refs.

NASA N62-14008 $5.60

Iowa State U., Iowa City.
THE MORPHOLOGY AND TEMPORAL VARIATIONS OF THE VAN ALLEN RADIATION BELT, OCTOBER 1959-DECEMBER 1960, by S. E. Forbush, G. Pizzella, and D. Venkatesan. Rept. on Contracts NASw-17 and N9onr-93803. SUI-62-13.

NASA N62-14635 $1.10

New York U., N. Y.
THEORETICAL STUDY OF ATOMIC AND MOLECULAR GASES AND THEIR REACTIONS IN THE UPPER ATMOSPHERE, by R. C. Sahni. Summary rept. 1 May 61-30 Apr 62, on NASA Grant NsG-70-60. [1962] 7 p.

NASA N62-10075 $1.60

Radioscience Lab., Stanford U., Calif.
IONOSPHERIC ELECTRON CONTENT CALCULATED BY A HYBRID FARADAY-DOPPLER TECHNIQUE, by Fernando de Mendonça and O. K. Garriott. Rept. on NASA Grant NsG-30-60. Dec 61, 9p. 9 refs.

NASA N62-11523 $8.60

Space Physics Research Lab., U. of Michigan, Ann Arbor.
THEORY OF CURRENT COLLECTION OF MOVING SPHERICAL PROBES, by Madhoo Kanal. Scientific rept. no. JS-5 on NASA Contract NASw-139; Contract AF 19(604)6124. Apr 62, 90p. 12 refs. Rept. no. 03484, 03599-9-S.

Seismology

TEI-782 $1.00

Geological Survey, Washington, D. C.
FREQUENCY OF EARTHQUAKES FOR SELECTED AREAS IN THE WESTERN UNITED STATES FOR THE PERIOD 1945-59, by W. S. Twenhofel, R. A. Black, and D. F. Balsinger. Feb 61, 39p. 2 refs.

analyzed. Polarization has been pronounced at moderate current densities and corrosion reactions have been prominent. NiO and ZnO, doped to various levels with Li^{+} and Ga^{+3}, have been prepared as sintered specimens. NiS has also been prepared and shows complete retention of high temperature ($B8_1$) structure at room temperature. (Author)

EARTH SCIENCES

TEI-796 $0.50

Geological Survey, Washington, D. C.
PRELIMINARY EVALUATION OF THE SEISMICITY, GEOLOGY, AND HYDROLOGY OF THE NORTHERN SAND SPRINGS RANGE, CHURCHILL COUNTY, NEVADA, AS A POSSIBLE SITE FOR PROJECT SHOAL, by William S. Twenhofel, John E. Moore, and Rudolph A. Black. July 61, 24p. 3 refs.

PB 159 785 $5.60

Iowa State U. [of Science and Tech.] Ames.
TUNDRA RELIEF FEATURES NEAR POINT BARROW, ALASKA, by Keith M. Hussey and Ronald W. Michelson. Rept. on Contracts [N]onr-236 and [N]onr-260. June 61, 51p. 28 refs.

DESCRIPTORS: *Mapping, *Aerial photography, *Permafrost, Terrain, *Lakes, Geophysics, Drainage, Ice, Melting, *Alaska.

This report describes some of the minor relief features and their topographic setting, with respect to their relationship to surface geomorphic processes and to subsurface conditions of the permanently frozen ground; the evolution of the present topography is analyzed as it is determined by subsurface ground-ice conditions, and the aerial photo interpretation of terrain features is discussed.

TID-15914 $1.60

Lamont Geological Observatory, Columbia U., Palisades, N. Y.
NATURAL RADIOCARBON IN THE SUBSURFACE WATERS OF THE CARIBBEAN, by Robert D. Gerard and Wallace S. Broecker. Rept. on Contract AT(30-1)-2663. May 62, 17p. 2 refs.

Climatology and Meteorology

PB 155 589 $6.60

McGill U. (Canada).
A SELECTION OF LECTURES PRESENTED TO THE SEMINAR IN ARCTIC AND STRATOSPHERIC METEOROLOGY NO. 3, JULY 27 TO AUGUST 7, 1959 AT STANSTEAD COLLEGE, STANSTEAD, QUEBEC PROVINCE, CANADA, by Warren L. Godson. Scientific rept. no. 12 on Contract AF 19(604)3865. Jan 61, 65p. Arctic Meteorology Research Group Pub. in Meteorology no. 34; AFCRL-TN-61-208; AD-253 845.

DESCRIPTORS: Arctic regions, *Meteorology, Stratosphere, Canada, *Symposia.

Contents:
Atmospheric ozone and the stratosphere
  Observations of total ozone
  Vertical distribution of ozone
  Ozone changes
Atmospheric radiation in the stratosphere
  General principles of infrared radiative transfer and the special case of isolated spectral lines
Atmospheric gases and radiative transfer
Radiation and energy balance in the stratosphere

NASA N62-14768 $5.60

Rand Corp., Santa Monica, Calif.
ECONOMIC GAINS FROM STORM WARNING; TWO FLORIDA CASE STUDIES, by Harold Demsetz. Rept. on Contract NASr-21(01). July 62, 52p. 3 refs. Memo. RM-3168-NASA.

NASA N62-14629 $1.10

Wisconsin U., Madison.
METEOROLOGICAL DATA PROCESSING, by V. E. Suomi and R. J. Parent. Progress rept. 1 July 61-31 Mar 62, on NASA Contract NASw-65. 31 May 62, 7p.

Geology

RME-4515 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE HUALLANCA DISTRICT DOS DE MAYO PROVINCE, DEPARTMENT OF HUANUCO, PERU, by Justin B. Moses and Victor Jordan O. Nov 57, 18p. 4 refs. In cooperation with Junta de Control de Energia Atomica, Lima(Peru).

RME-4514 $0.50

Atomic Energy Commission. Div. of Raw Materials, Washington, D. C.
RECONNAISSANCE FOR URANIUM IN THE OLMOS DISTRICT, NORTHERN PERU, by Justin B. Moses and Cesar Rangel Z. Oct 57, 17p. 3 refs. Prepared in cooperation with Junta de Control de Energia Atomica, Lima (Peru).

UCRL-13040 $1.75

Colorado School of Mines Research Foundation, Inc., Golden.
REVIEW OF FRACTURING THEORIES, by David C. Card, Jr. Rept. on Contract W7405-eng-49. 16 Apr 62, 72p. 57 refs.

NASA N62-14404 $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
HELICOPTER DESIGN AND CAPABILITY TRENDS AS SEEN FROM A RESEARCH VIEWPOINT, by F. B. Gustafson, [1962] 32p. 4 refs.

NASA N62-10943 $1.60

Metallurgical Research Labs., Syracuse U., N. Y.
MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE, by R. J. Sell, C. Chave, and V. Weiss. Quarterly progress rept. no. 1, 24 Apr-23 July 61, on NASA Contract NASr-43. July 61, 32p. 5 refs. Rept. MET-E-873-617-QP1.

NASA N62-14640 $1.60

Metallurgical Research Labs., Syracuse U., N. Y.
MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE, by R. J. Sell, C. Chave, and V. Weiss Quarterly Progress rept. no. 1A, 23 Apr-30 June 62, on Contract NASr-43. July 62, 12p. MET. E. 873-6111-QP1A.

AD-275 293 $3.60

National Aeronautical Establishment (Canada).
EXPERIMENTAL THRUST AUGMENTATION OF A VARIABLE GEOMETRY, TWO-DIMENSIONAL, CENTRAL NOZZLE EJECTOR, by A. M. Drummond and D. G. Gould. Jan 62, 35p. 3 refs. Aeronautical rept. LR-328; NRC no. 6708.

DESCRIPTORS: *Air ejectors, Exhaust gases, *Thrust augmentor nozzles, Exhaust gas ejectors, Geometry, Design, Gas flow, Thrust, Tests, Vertical take-off planes, Short take-off planes.

The thrust augmentation of a two-dimensional central nozzle ejector was determined for a range of values of secondary to primary flow area ratio, mixing tube length to width ratio and mixing tube diffusion angle. Maximum thrust augmentation was obtained for a mixing tube length to width ratio of about 6 for all area ratios. The augmentation increased as the secondary to primary area ratio was increased to a value of 19, and remained at a constant value of 1.3 with further increases in area ratio. For values of area ratio less than 19, the ratio of the measured to theoretical augmentation was 0.84. An increase in augmentation of about 10 percent was achieved by diffusing the mixing tube walls to a total angle between 2 and 4 degrees. The two-dimensional tests agreed well with those for an axially symmetric, central nozzle ejector. The Reynolds number, based on the primary nozzle width, varied from about 4×10^5 to about 6×10^5. (Author)

AD-275 300 $2.60

National Aeronautical Establishment (Canada).
PROPERTIES OF A STRESS-CARRYING INSULATING COMPOSITE OF VERMICULITE AND SODIUM SILICATE, by W. Wiebe. Feb 62, 26p. 2 refs. Aeronautical rept. LR-332; NRC no. 6744.

DESCRIPTORS: *Thermal insulation, Refractory materials, *Composite materials, *Vermiculite, *Sodium compounds, Silicates, Adhesives, Aerodynamic heating, Particles, Tensile properties, Temperature, Stability, Thermal conductivity, Density, Stresses, Elasticity, Processing, Supersonic planes, Airframes, Transport planes.

A study has been made of the strength characteristics, density, and thermal properties of a lightweight refractory insulation material composed of vermiculite aggregate bonded with sodium silicate. The investigation has indicated that the material, after exposure to temperatures between 500° and 800°F, possesses dimensional stability, compressive strengths ranging from 100 to 150 lb./in.^{2}, thermal conductivity values not in excess of 1.0 B.t.u.-in./ft.^{2} hr. °F for mean specimen temperatures approaching 500°F, and densities ranging between 18 and 20 lb./ft.^{3} (Author)

NASA N62-14104 $10.10

National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICAL AND ASTRONAUTICAL EVENTS OF 1961, by Eugene M. Emme and Frank W. Anderson, Jr. Jan 62, 127p.

Subsequently pub. as a Committee Print on the House Committee on Science and Astronautics, 87th Congress, 2nd Session (NASA N62-13992)

PB 159 841 $9.10

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF A CENTRAL FACILITY CONCEPT FOR THE CONTROL OF AIR TRAFFIC IN THE CHICAGO METROPOLITAN AREA, by D. O. Brown, R. Cassell and others. Final rept. Dec 61, 102p. Task no. 101-109T.

DESCRIPTORS: Air traffic, Control, *Airport control towers, *Air traffic control systems, Simulation, *Control simulators, Feasibility studies, *Illinois.

This report describes the evaluation of a central facility concept by simulating the Chicago metropolitan area and using new control procedures and techniques. The simulation was conducted using the new Model B dynamic air traffic control simulator at the National Aviation Facilities Experimental Center, Atlantic City, New Jersey. Modified traffic control systems and equipment layouts were tested in two phases for the purpose of devising a more efficient means of controlling instrument traffic from a central facility. The present system in use at Chicago was not tested. The

NASA N62-13661 $6.60

Seismological Lab., Calif. Inst. of Tech., Pasadena.
A SEISMOMETER FOR RANGER LUNAR LANDING, by F. B. Lehner, E. O. Witt, and others. Final rept. on Contract NASw-81. 15 May 62, 65p. 5 refs.

ENGINEERING

BM-RI-5888 $0.50

Bureau of Mines, College Park, Md.
IN SITU DETERMINATION OF THE DYNAMIC ELASTIC CONSTANTS OF ROCK, by Harry R. Nicholls. Dec 60, 20p.

Presented at International Symposium on Mining Research, Missouri School of Mines and Metallurgy, Rolla, Mo., Feb. 22-25, 1961.

PB 181 168 $15.00

Committee on Ship Structure, National Research Council, Washington, D. C.
A GUIDE FOR THE ANALYSIS OF SHIP STRUCTURE ed. by Thein Wah (Southwest Research Inst.). 10 Nov 60, 575p. 757 refs.

DESCRIPTORS: *Handbooks, *Ships, Structures, Design, Mathematical analysis, Motion, Load distribution, Dynamics, Ship plates, Ship bulkheads, Ship decks, Girders, Stresses, Temperature, Mechanics.

Introduction
Ships motions and loading conditions
Ship structural dynamics
Plating under lateral loads
Plating under in-plane loads
Plating under combined lateral and in-plane loads
Special problems in the design of bulkheads, bottom structures and deck plating
Stress concentrations around openings in plating
Box girder analysis
Transverse structures
Structural connections
Temperature effects
Mechanics of materials

PB 160 951 $3.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
LAUNDRY WATER RECOVERY BY FLOTATION CLARIFICATION, by J.E. Halton and J. V. Graham. Final rept. 6 July 60, 36p. 1 ref. Technical rept. R-081; AD-240 935.

DESCRIPTORS: *Water, Purification, Water softeners, Colloids, *Sanitary engineering, Water tanks, Detergents, Naval equipment, Washing machines, Chemical reactions, Tests, Test equipment, Flotation, Chemicals, Separation.

A laundry water recovery process was designed to conserve fresh water. The flotation clarification process is inexpensive and efficient and has been tested and simplified. It is now ready for in-service testing. (Author)

Aeronautical Engineering

AD-283 008 $2.50

Curtiss-Wright Corp., East Paterson, N. J.
DEVELOPMENT OF AN AUTOMATIC MOINTORING SYSTEM FOR FLIGHT SIMULATORS, by A. T. Benenati, R. Hull and others. Rept. Nov 59-Mar 61, on Training Equipment, Simulators, and Techniques for Air Force Systems, Contract AF 33(616)6891. May 62, 113p. MRL-TDR-62-47.

DESCRIPTORS: *Flight simulators, Automatic, *Monitors, Design, Magnetic tapes, Memory devices, Switching circuits, Digital computers, Computer logic, Punched card methods, *Programming, Coding, Analog-to-digital converters, Training devices, *Automation, *Computers

The design study of an automatic monitoring system for flight simulators is presented. System basic functions are: (1) recording and playback and (2) evaluatior and scoring. The recording and playback facilities allow the recording of pertinent parameters of a simulated flight mission. The recording of any part or all of the mission can be played back into the flight simulator for re-enactment at any desired time. Objective evaluation and scoring of the trainee is accomplished by comparison of monitored parameters to the programmed criteria. Student errors in performance are printed by the device onto a cue sheet readily accessible to the instructor. Functional flexibility, the degree of automation required, size, and complexity of the simulator to be monitored are the factors that most affect the design. (Author)

AD-282 852 $2.25

General Electric Co., Schenectady, N. Y.
DESIGN CRITERIA FOR BEARING SYSTEMS FOR USE IN HIGH TEMPERATURE AIRCRAFT ELECTRICAL ACCESSORIES, PHASE III, AN EXPERIMENTAL EVALUATION, by P. Lewis. Final rept. May 58-Aug 61, on Power Conversion and Transmission Technology, Contract AF 33(616)5766. May 62, 86p. 7 refs. ASD-TR-61-232.

DESCRIPTORS: Aircraft, Electrical equipment, *Bearings, Design, Temperature, Lubrication, Oils, Greases, High temperature research, Tests.

A program is described which had as its objective the attainment of several cycles of operation including portions at 700 F and the simulated pressure of 80,000 feet. Major attention was given to grease packed bearing systems. The most successful performance was obtained with both an auxiliary grease supply and periodic injection of base fluid to the grease. A circulating grease system is described which shows promise for improved elevated temperature operation. Some attention was given to the use of an oil lubricated system. This was not as promising as the grease system. Dry Operation is discussed, and preliminary data is presented. (See also PB 151 519) (Author)

NASA N62-10529 $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
RECEIVER TECHNIQUES AND DETECTORS FOR USE AT MILLIMETER AND SUBMILLIMETER WAVELENGTHS, by William S. C. Chang, Richard A. Williams, and Michael H. Spring. Semi-annual rept. 1 Mar-31 Aug 61, on NASA Grant NsG-74-60. 1 Sep 61, 30p. refs. Rept. 1093-4.

NASA N62-11447 $2.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
RECEIVER TECHNIQUES AND DETECTORS FOR USE AT MILLIMETER AND SUBMILLIMETER WAVE LENGTHS. Annual summary rept. 1 Mar 61-28 Feb 62, on NASA Grant NsG-74-60. 1 Mar 62, 21p. 5 refs. Rept. no. 1093-8.

NASA N62-10115 $4.60

Arkansas U. Graduate Inst. of Tech., Little Rock.
BASIC EXPERIMENTAL RESEARCH LEADING TO IMPROVED COLD ELECTRON SOURCES AND NEW TYPES OF VELOCITY FILTER MASS SPECTROMETERS, by M. K. Testerman. Semiannual status rept. no. 1, 1 July-31 Dec 61, on NASA Grant NsG-153-61. [1962] 45p.

NASA N62-14623 $8.50

Automatic Control Center, Purdue U., Lafayette, Ind.
OPTIMUM NONLINEAR CONTROL FOR STEP AND PULSE DISTURBANCES, by Robert Chung-Ching Chang. Master's thesis. Rept. on NASA Grant NsG-28-59. June 62, 93p. 12 refs.

NASA N62-10828 $14.00

Automatic Control Center, Purdue U., Lafayette, Ind.
PREDICTOR CONTROL OF A SECOND- AND THIRD-ORDER NONLINEAR SYSTEM, by John C. Nicklas. Doctoral thesis. Rept. on NASA Grant NsG-28-59. June 60, 199p. 58 refs.

Also published as:
OPTIMUM ON-OFF CONTROL OF SECOND- AND THIRD-ORDER NONLINEAR PROCESSES.

NASA N62-14625 $5.60

Automatic Control Center, Purdu U., Lafayette, Ind.
STABILITY OF SUBHARMONIC OSCILLATIONS IN NON-LINEAR SYSTEMS, by Robert Edward Nicholls. Master's thesis. Rept. on NASA Grant NsG-28-59. June 62, 60 p. 12 refs.

PB 181 393 $0.75

Bureau of Naval Weapons, Washington, D. C.
AN/URM-25, AN/URM-25A, AN/URM-25C RF SIGNAL GENERATOR SETS. Technical manual, Navy Calibration Program. 30 July 62, 24p. Instrument Calibration Procedure AG-43.

DESCRIPTORS: Radiofrequency, *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals, Crystal oscillators, Oscillators.

This procedure describes the calibration of the AN/URM-25, AN/URM-25A, AN/URM-25B, and AN/URM-25C RF Signal Generator Sets, which are designed to produce radio frequency signals that are continuously variable from 0.1 to 100,000 microvolts, modulated or unmodulated, over a continuous frequency range of 10 kc to 50 Mc. The instrument consists primarily of a crystal oscillator, an RF oscillator, 400 and 1000 cps audio oscillators, an output multiplier and EVM, and a regulated power supply.

PB 181 402 $0.50

Bureau of Naval Weapons, Washington, D. C.
DC RESISTANCE, 0.001 TO 1.0 OHM. BuWeps-BuShips Calibration Program. 2 Sep 58, rev. 12 May 60. 11p. Secondary Standards Lab. Measurement System Operation Procedure BR-01.

DESCRIPTORS: Direct current, *Resistance, Measurement, Calibration, Instrumentation, Instruction manuals, Electric bridges.

This procedure utilizes a Kelvin bridge to measure resistance in the range of 0.00001 to 1 ohm. The resistance measurements are accomplished by connecting the Test Instrument directly to the Kelvin bridge and adjusting the Kelvin bridge controls for a balance. The resistance value is determined by adding the Kelvin bridge standard slider indication to the plug setting value. The sum is then multiplied by 0.0001 times the ratio dial setting. To minimize the effect of certain systematic errors, two measurements are made for each resistance value, one with the polarity of the bridge current reversed. The two resulting values are averaged for each determination.

PB 181 395 $0.50

Bureau of Naval Weapons, Washington, D. C.
ELECTRONIC VOLTMETER, BALLANTINE LABORATORIES 300 OR ME-6/U. Technical manual, Navy Calibration Program. 15 June 62, 20p. Instrument Calibration Procedure AE-27.

DESCRIPTORS: Electronic equipment, *Voltmeters, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the Ballantine Laboratories model 300 or the ME-6/U, which are electronic voltmeters that measure voltages from 1.0 millivolts to 100 volts over the frequency range of 10 cps to 150 kc.

results of this evaluation show that a central facility is practicable within the Chicago metropolitan area. It is recommended that consideration be given to its implementation in the Chicago area and that it be considered feasible for application in other metropolitan areas. (Author)

PB 160 361 $4.60

Naval Medical Research Inst., Bethesda, Md.
THE VISIBILITY OF AIRPORT RUNWAYS, by Norman Lee Barr, T. A. Hussman, Jr., and J. F. Parker, Jr. Vol. 12, p. 435-480. 15 Nov 54, 47p. 8 refs. Research rept. on Project NM 001 056.07.03 and BUAER Project TED PTR AC223.

DESCRIPTORS: *Airports, *Runways, Visibility tables, Concrete, Asphalt, Terrain.

This report presents results of a systematic survey of the brightness contrast between runway and terrain surfaces at 30 eastern airfields and demonstrates the influence and importance of brightness difference between runway and surrounding terrain on runway visibility. Tables are presented giving, for each runway at each airfield, a description of the runway surface, runway reflectivity, a description of the terrain cover, terrain reflectivity, and the inherent contrast between runway and surrounding terrain. The importance of brightness contrast is demonstrated and discussed as a determiner of runway visibility under various atmospheric conditions and at different distances from the runway. The extent to which runway visibility can be increased by increasing the inherent brightness difference between runway and surrounding terrain through the selection of runway materials and terrain cover is illustrated. (Author)

PB 160 360 $1.60

Naval Medical Research Inst., Bethesda, Md.
THE VISUAL ASPECTS CONCERNED WITH LANDING AIRCRAFT ABOARD CARRIERS AT NIGHT, by Alfred A. Schiller. Rept. no. 1 on Project NM 001 008 19 July 48, 19p. 6 refs.

DESCRIPTORS: *Carrier landings, Vision, *Night landings, Aircraft carriers, Flight decks, *Landing aids, Visual signals, *Fluorescence, *Visual perception.

An attempt was made in the laboratory to isolate and investigate the visual problem of the landing signal officer (LSO), in seeing the approaching aircraft; and the visual pilot in seeing the LSO and discriminating his signals. Instruments (a modified Beckman spectrophotometer and a fluoro-illuminometer) for quantitatively evaluating fluorescent material are described. A visual discriminometer for determining the optimal specifications of specific signal objects on perceptual acuity is presented. A mechanical signal panel (MSP) is described which would not reflect the musculoskeletal response of the LSO and which would relieve the LSO from the former of his double duties; namely, his dual function as the signal and signaler from the standpoints of LSO and the pilot. (Author)

NASA N62-14630 $6.60

Syracuse U. Research Inst., N. Y.
MATERIAL EVALUATION FOR A SUPERSONIC TRANSPORT PLANE, by V. Weiss, R. Sell, and C. Chave. Final rept. 23 Apr 61-23 Apr 62, on Contract NASr-43. June 62, 68p. 4 refs. SURI rept. no. MET. E. 873-626-F.

Chemical Engineering

NYO-9649 $2.00

Engineering Research Labs., Columbia U., New York.
HEAT TRANSFER AND PRESSURE DROP IN ECCENTRIC ANNULI, by Theodore Diskind. Rept. on Contract AT (30-3)187. 30 Sep 61, 91p. 3 refs.
CU-1-61-AEC-187-Ch. E.

OTS SB-419, Revised $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
DESALINATION OF WATER. July 62, 9p. 131 refs. OTS Selective Bibliography SB-419, rev.

DESCRIPTORS: Water, Sea water, *Desalination, *Bibliography.

Lists 131 foreign and domestic reports added to the OTS collection through July 1962. Covers research on distillation, evaporators, geothermal energy, saline and sea water, solar distillation, solar energy, solar stills, freezing techniques, filtering, nuclear reactor processes extraction methods, zone purification processes, ion-exchange processes, chelation, gas hydrates as demineralizing agents, electrical methods, desalting kits, and salinometers among other subjects. Includes 63 Office of Saline Water research and development contract reports issued to date. (Author)

TID-13964(Rev.) $4.60

Savannah River Lab., Aiken, S. C.
THE ECONOMICS OF HEAVY WATER PRODUCTION, by J. F. Proctor and V. R. Thayer. 19 Jan 62, 43p. 18 refs.

KY-399 $0.50

Union Carbide Nuclear Co., Paducah, Ky.
DESIGN OF A PILOT SCALE FLUORINE CELL RESEARCH FACILITY, by W. K. Henderson, W. B. Goode and others. Rept. on Contract W-7405-eng-26. 19 July 62, 19p. 3 refs.

PB 181 392 $0.50

Bureau of Naval Weapons, Washington, D. C.
TEST OSCILLATOR SET AN/PRM-10. Technical manual, Navy Calibration Program. 8 Aug 60, rev. 1 Aug 62. 14p. Instrument Calibration Procedure AG-48.

DESCRIPTORS: *Oscillators, Test equipment, Calibration, Instrumentation, Instruction manuals.

The Test Instrument is an oscillator and wavemeter having a frequency range from 2 to 400 Mc.

PB 181 394 $1.00

Bureau of Naval Weapons, Washington, D. C.
VHF SIGNAL GENERATOR, HEWLETT-PACKARD 608C. 608D, TS-510/U(AN/USM-44), OR TS-510A/U(AN/USM-44A). Technical manual, Navy Calibration Program. 6 Nov 58, rev. 1 June 62. 37p. Instrument Calibration Program AG-06.

DESCRIPTORS: Very high frequency, *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals, Radiofrequency, Frequency.

The HP 608D or AN/USM-44 furnishes RF signals from 0.1 μv to 0.5v over the frequency range of 10 to 420 Mc, while the HP 608C furnishes RF signals from 1 μv to 1.0v over the frequency range of 10 to 480 Mc. All units have provisions for external pulse modulation and internal or external sine wave modulation. The HP 608D and AN/USM-44 units have a crystal-controlled heterodyne calibrator providing 1 mc and 5 mc check points over the entire frequency range.

PB 160 847 $11.50

Carrier Corp., Syracuse, N. Y.
A THERMOELECTRIC GENERATOR, by Matthew G. Ryan, Wallace E. Sonntag, and N. John Stevens. Rept. no. 12 (Final) on Contract NObs-77092. [1960] 158p.

DESCRIPTORS: *Thermoelectric generators, Generators, Design, Tests, Thermoelectricity, Thermocouples.

A thermoelectric generator panel has been developed which realizes the promise given by individual couple tests. Characteristics with regard to performance have been evaluated experimentally. The direction of improvement in specific power output with respect to area, volume and weight is clear, and an increase in efficiency with such improvement seems likely.

PB 160 842 $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
HIGH TEMPERATURE SEMICONDUCTING COMPOUNDS FOR THERMOELECTRIC POWER GENERATION, by C. B. Jordan. Bimonthly progress rept. no. 4, 15 June-15 Aug 61, on Contract NObs-84327. 30 Aug 61, 10p. 1 ref. EOS rept. 1592-2M-4.

DESCRIPTORS: *Semiconductors, Materials, Synthesis, *Thermoelectricity, Thermoelectric generators, Generators, Resistance, Electrical properties, Measurement, Thermal conductivity.

Synthesis of the materials of interest was continued, following the procedures described previously. Measurements of electrical resistivity and of Seebeck coefficient were made on the monochalcogenides ThS, ThSe, ThTe, US, USe, and UTe from room temperature to about 1000°C, and further work to develop suitable means of analysis of the synthesized materials was carried out.

NASA N62-14702 $1.10

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
INSTRUCTION MANUAL, REAL-TIME TELEMETRY SYSTEM, PROJECT RELAY, by Gene H. Melton. 17 July 62. 9p. Rept. X-564-62-112.

NASA N62-14083 $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
LARGE GROUND ANTENNAS, by Eberhardt Rechtin, Bruce Rule, and R. Stevens. Rept. on Contract NAS7-100. 20 Mar 62, 56p. 10 refs. Technical rept. TR-32-213.

NASA N62-14274 $2.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
SS-FM: A NEW TELEMETRY TECHNIQUE, by Walter O. Frost. 16 Oct 61, 30p. 2 refs. MTP-G&C-I-61-39.

PB 160 852 $1.60

Merck and Co., Inc., Rahway, N. J.
STRUCTURAL INVESTIGATIONS IN THERMOELECTRIC MATERIALS, by P. I. Pollak, J. B. Conn, and others. Progress rept. no. 7, 1 June-31 July 61, on Contract NObs-78503. [1961] 16p. 1 ref.

DESCRIPTORS: *Thermoelectricity, *Materials, Lead compounds, Antimony compounds, Bismuth compounds, Sulfides, Selenides, Tellurides, Alloys, Semiconductors, Thermal conductivity, Electrical properties, Crystal structure, Rare earth elements, Transition elements, Complex compounds.

Experimental procedures for the preparation of lead antimony sulfide, selenides, and tellurides and the initial measurements of thermoelectric properties are reported. In addition, there is included a report about the effect of the introduction of rare earth and transition metals into the bismuth-antimony-selenide-telluride alloys.

PB 181 400 $0.50

Bureau of Naval Weapons, Washington, D.C. FREQUENCY-POWER METER TS-230C/AP. Technical manual, Navy Calibration Program. 15 July 62, 15p. Instrument Calibration Procedure GQ-09.

DESCRIPTORS: *Frequency meters, *Power meters, Meters, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of TS-230C/AP Frequency-Power Meter, which is a portable, battery-operated test set designed to measure frequencies in the range of 8500 to 9700 Mc, and average power from 0.1 to 1000 mw.

PB 181 389 $2.75

Bureau of Naval Weapons, Washington, D. C. FREQUENCY STANDARDS AND MEASUREMENTS, by Dave Ablowich, Jr. BuWeps-BuShips Calibration Program. 1 May 62, 121p. 70 refs. Engineering circular 7; MET D-33.

DESCRIPTORS: *Frequency, Very low frequency, Standards, Measurement, Calibration, Time, Time interval counters, Antennas, Nuclear resonance, *Frequency meters.

Contents:
Interrelation of frequency and time
Basic standards of frequency
Navy very low frequency (VLF) system
Measurement of frequency and time
Calibration of standards of frequency
VHF comparison
Distribution of standard frequencies
Antennas for standard frequency reception
Nuclear resonance devices
Precise time and constant frequency VLF broadcast
Precision frequency standards (VLF synthesizer)
WWV antenna installation information, SLIM revision
rogers underground system of reception

PB 181 391 $0.50

Bureau of Naval Weapons, Washington, D. C. MICROWAVE CRYSTAL TEST SET, AIRBORNE INSTRUMENTS LABORATORY TYPE 390-1, TYPE 390A-2, TYPE 390A-3. Technical manual, Navy Calibration Program. 30 July 62, 9p. Instrument Calibration Procedure AY-10.

DESCRIPTORS: *Microwave equipment, Crystals, *Test sets, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the type 390-1, 390A-2, or 390A-3 microwave crystal test set, which is a portable battery-powered instrument designed to measure the relative noise figure of microwave mixer crystals. The type 390A-3 microwave crystal test set may also be used to match crystals for use in balanced mixers, and to measure the relative sensitivity of microwave detector crystals.

PB 181 399 $0.75

Bureau of Naval Weapons, Washington, D. C. PLATFORM SCALES TO 2000 POUNDS (MINIMUM GRADUATION NOT LESS THEN 1 OUNCE). Technical manual, Navy Calibration Program. 15 July 62, 26p. 2 refs. Instrument Calibration Procedure MM-01.

DESCRIPTORS: *Balances, Calibration, Instrumentation, Instruction manuals.

PB 181 396 $0.50

Bureau of Naval Weapons, Washington, D.C. PREAMPLIFIER, LOW-LEVEL DIFFERENTIAL, AC, TEKTRONIX TYPE E. Technical manual, Navy Calibration Program. 3 Dec 59, rev . 15 June 62, 14p. Instrument Calibration Procedure AA-14.

DESCRIPTORS: Alternating current, *Preamplifiers, Amplifiers, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the Tektronix type E preamplifier, designed to be used with the Tektronix 530, 540, and 550 series oscilloscopes. The instrument consists primarily of a dual-channel amplifier. Each channel is provided with an input attenuator and a frequency-limiting filter.

PB 181 401 $0.75

Bureau of Naval Weapons, Washington, D. C. RF SIGNAL GENERATOR SET AN/URM-26 OR AN/URM-26B. Technical manual, Navy Calibration Program. 6 July 60, rev. 15 June 62. 22p. Instrument Calibration Procedure GG-06.

DESCRIPTORS: Radiofrequency, *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals.

PB 181 390 $0.75

Bureau of Naval Weapons, Washington, D. C. RF SIGNAL GENERATOR SET AN/URM-26A. Technical manual, Navy Calibration Program. 18 Apr 60, rev. 15 June 62. 23p. Instrument Calibration Procedure GG-05.

DESCRIPTORS: Radiofrequency, *Signal generators, Generators, Calibration, Instrumentation, Instruction manuals.

This procedure describes the calibration of the AN/URM-26A RF signal generator set, which consists of the SG-45A/URM-26 signal generator, various accessories, and auxiliary parts. The instrument provides a continuously variable RF output from -13 to -127 dbm over the frequency range of 3 to 450 Mc, when terminated with 50Ω, and includes provision for internal or external audio modulation, or external pulse modulation.

PB 160 841 $1.10

Ohio State U. Research Foundation, Columbus.
THERMOELECTRIC MATERIALS, by Henry E. Wenden, S. R. Ali Zaidi, and Thomas S. Shevlin. Bimonthly progress rept. no. 2, 1 Mar-30 Apr 60, on Contract NObs-78254. 4 May 60, 8p. Rept. no. 1039-2 AD-245 907.

DESCRIPTORS: *Thermoelectricity, *Electric power production, Vanadates, Sodium compounds, Oxides, Electrical properties, Helium, Oxygen, Hydrogen, *Semiconductors.

Studies were continued of the effect of oxidizing and reducing atmospheres on the emf produced by $Na_2O.6V_2O_5$. An apparatus was designed to study the differential Seebeck coefficients of liquid materials which are exposed to particular gas atmospheres. It was concluded that (1) the hot end state or condition (state H) more nearly approaches ($V(+5)$) and attendant coordination, (2) the cold end state (state C) approaches ($V(+4)$), (3) the reducing atmoshpere at the hotter end of the molten sample tends to change state H to state C, with the evolution of O, (dissociation or reduction) the evolved O being carried away by the circulating gases, and (4) this atmospheric-dependent tendency to change the energy state results in lowering the energy difference between the excited electrons in the hot and cold ends of the tube and hence in reducing the flow of electrons, the net result of which is the reduction in emf per degree temperature difference. (See also PB 160 840)

NASA N62-14130 $1.10

Oklahoma State U. Research Foundation, Stillwater.
DEVELOPMENT OF TRANSISTORIZED MINIATURE FIFTEEN-CHANNEL PULSE-TIME TELEMETER TRANSMITTING SET, by Oscar L. Cooper. Informal quarterly progress rept. no. 4, 1 July-30 Sep 61, on NASA Contract NASr-4. Oct 61, 8p.

SCTM-129-62(24) $8.60

Sandia Corp., Albuquerque, N. Mex.
AN AUTOMATIC STANDARD CELL COMPARATOR, by D. W. Braudaway. May 62, 95p.

PB 159 722 $6.60

Stanford Electronics Labs., Stanford U., Calif.
SOLID-STATE ELECTRONICS RESEARCH. Consolidated quarterly status rept. no. 10, 1 Jan-31 Mar 61, on Contracts Nonr-225(31), 225(24); DA 36-039-sc-85339, -73178, -78296, -85387; AF 33(616)6207, 7726; AF 49(638)660, and DA 04-200-ORD-1087. [1961] 68p. 18 refs.

DESCRIPTORS: *Solid state physics, *Electronics, *Scientific research, Electronic equipment, Microwave oscillators, Microwave amplifiers, Masers, Switching circuits, Parametric amplifiers, Silicon, Semiconductors, Germanium, Carbides.

Contents:
Neuristor studies; Models of thermoelectric devices; Reliable microsystems; Neuristor realization; Photoconductivity-electroluminescence studies; Improvement of reliability by redundancy and adaption; Adaptive switching circuits; Networks of adaptive memistor neurons; Memistor research; Studies in multi-layer networks of adaptive neurons; Switching type regulators; Miscellaneous short-term activities; Variable delay lines for phase modulation; A study of nonlinear distortion of transistors; A study of field effect switching devices; Studies of breakdown in silicon; Study of hot electrons in silicon; Silicon oxide capacitors; Neuristor device study; Hot electrons in germanium; Epitaxial techniques; Surface field effect amplifiers; Thin-film silicon-carbide devices; Solid-state microwave amplifying and generating devices; Large-signal analysis of nonlinear transmission lines; Properties of small contacts to semiconductors; Electron and phonon behavior in solids; High-speed high-current switching devices; Parametric circuits; Diffusion of impurities in III-V compound semiconductors; Adaptive elements; Broadband maser amplifiers; Theoretical studies of solid-state masers; CW optical maser development; Optical maser development; Solid-state masers; Parametric amplifiers; Ferrimagnetic filters and resonators. (See also PB 157 552)

PB 160 950 $11.00

Stanford Research Inst., Menlo Park, Calif.
STUDY OF EFFECTS AND CONTROL OF SURFACE CONTAMINANTS ON ELECTRICAL MATERIALS, by Saul W. Chaikin. Rept. no. 12 (Final), 16 Dec 57-15 Dec 59, on Contract DA 36-039-sc-74965, continuation of Contract DA 36-039-sc-64454. 15 Feb 60, 141p. 31 refs. SRI Proj. no. SU-2381; AD-236 240.

DESCRIPTORS: *Electric relays, *Conductors, Contamination, *Electric insulation, Surfaces, Control, Metals, Organic compounds, Vapors, Cleaning, Adsorption.

Contact failure in hermetically sealed relays was investigated. Sealed relay contact failure occurs from recognizable contamination and from obscure deposits some of which consist of infinitesimal amounts of Fe and Cu, probably in the oxide form. Others are organic in nature and could arise from the organic vapors found in the relay enclosures. Insulated outgassing can be a rich source of organic vapors but some insulating materials outgas very little. Insulating films on contact can be detected by a fine-wire electrical probe instrument employing a very low-level circuit. Transfer of infinitesimal quantities of the base metals, Fe and Cu, to contacts during their manufacture was demonstrated. Organic contact contamination by insulating materials and pure hydrocarbons was demonstrated. Contact metals showed increasing contamination sensitivity in the following order: Au, Ag, Au alloy, Rh, and Pd. Growths of organic crystals on Pd contacts were shown to cause failure in defective relays. Adsorption of organic vapors at room temperature by a commercial activated C preparation was demonstrated.

NASA N62-11314 $2.60

Minneapolis-Honeywell Regulator Co., Minn.
ADAPTIVE STATE VECTOR CONTROL. SECTION 9. ADAPTIVE CONTROLLERS DERIVED BY STABILITY CONSIDERATIONS, by E. R. Rang. Rept. on NASA Contract NASr-27. 15 Mar 62, 22p. 16 refs. MH-MPG rept. no. 1529-TR9.

NASA N62-14861 $1.60

Minneapolis-Honeywell Regulator Co., Minn.
MODES OF CONTROL, by C. A. Harvey. Rept. on Contract NASr-27. [1962] 13p. 2 refs.

PB 159 048 $5.60

Minnesota Mining and Mfg. Co., St. Paul.
"MAN-PACK" 250 WATT THERMOELECTRIC GENERATOR, by A. H. Mayala, D. D. Schley, and W. G. Krawczak. Final rept. on Contract Nobs-78198. 21 Nov 61, 53p.

DESCRIPTORS: *Thermoelectric generators, Generators, Mobile, Design, Construction, Model tests, Military personnel, Personnel, Power supplies, Lead, Tellurides.

The primary objective of this contract was to design, fabricate, and test a development model thermoelectric generator of the highest power-to-weight-ratio possible consistent with the ruggedness requirements of a field type unit. An objective weight limitation of 35 pounds was set as the maximum comfortable weight which could be carried by a foot soldier on a "backpack". The thermoelectric material specified was 3M lead-telluride for both "P" and "N" legs.

UNM-TR-EE-66 $3.60

New Mexico U. Engineering Experiment Station, Albuquerque.
THE MEASUREMENT OF INSTANTANEOUS POWER UTILIZING THE HALL GENERATOR, by Bill J. Harper. Technical rept. EE-66. Feb 62, 34p. SCDC-2636.

OTS SB-496 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
PRINTED ELECTRONIC CIRCUITS. July 62, 8p. 147 refs. OTS Selective Bibliography SB-496, supersedes CTR-249.

DESCRIPTORS: *Printed circuits, *Electronic circuits, Circuits, *Bibliography.

Lists 147 references of reports on printed circuits added to the OTS collection during the period 1947 to July 1962. Covers research on manufacturing methods, adhesives, metal to plastics bonding, zerographic processes, miniature and high temperature printed circuits among other subjects. (Author)

OTS SB-487 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
TRANSFORMERS (SUPPLEMENT TO CTR-336). July 62, 12p. 115 refs. OTS Selective Bibliography SB-487.

DESCRIPTORS: *Transformers, Insulating materials, Moisture, Design, *Bibliography.

Lists 115 foreign and domestic references added to the OTS collection during the period January 1958 to July 1962. Covers research on insulating material for transformers, moisture content, design criteria, and various types of transformers such as: pulse, step, high temperature, miniature, solid state, transmission line, ceramic I-F and impedance matching transformers. (Author)

OTS SB-433 Suppl. 1 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
TRANSISTORS. Aug 62, 20p. 391 refs. OTS Selective Bibliography SB-433, suppl. 1.

DESCRIPTORS: *Transistors, *Bibliography.

Lists 391 references of foreign and domestic research on transistors. Covers industrial preparedness studies, solidstate instrumentation, nuclear radiation resistant transistors, high temperature transistors, power transistors, transistor circuits, transistor noise performance, transistor cooling among other subjects. (Author)

PB 160 840 $1.10

Ohio State U. Research Foundation, Columbus.
THERMOELECTRIC MATERIALS, by Henry E. Wenden, Rasheed Ali Zaidi, and Thomas S. Shevlin. Bimonthly progress rept. no. 1, 1 Jan-29 Feb 60, on Contract NObs-78254. 4 Mar 60, 5p. Rept. no. 1039-1; AD-245 406.

DESCRIPTORS: *Ceramic materials, *Thermoelectricity, *Vanadates, Sodium compounds, Electrical properties, *Electric power production.

A study was undertaken of ceramic thermoelectric materials with emphasis on molten vanadates. Sodium metavandate, $Na_2O \cdot V_2O_5$ or $NaVO_3$, (I) and sodium vanadyl vanadate. $Na_2O \cdot V_2O_4 \cdot 5V_2O_5$ or $Na_2O \cdot 6V_2O_5$, (II) was prepared from Na_2CO_3 and V_2O_5. The Seebeck coefficients were determined by measuring opposed Seebeck effects for molten vanadate versus Pt or Pt-10% Rh. The emf values for I and II were, respectively, 400 and 600 $\mu v/^oC$ in the range 600° to 750°C. In each case the cooler contact was negative and the hotter contact was positive. Reversal of the temperature gradient direction produced a reversal of polarity. Both melts produced a 0 emf at 0 temperature gradient or net temperature difference. X-ray patterns before and after heating showed that alteration of the composition occurred during the course of experimentation. Creep of the melt over the alumina assay boat was extensive. It was concluded that the two compositions are promising thermoelectric materials.

Included in the report are:
Relation of magnetic structure to electrical conductivity in NiO and related compounds, pub. in the Physical Review 99:1232-1234, 1955
A study of the $Li_xMn_{(1-x)}O$ system, pub. in the Jnl. of the American Chemical Society 78:3255-3260, Apr 57
Reinvestigation of reported ferromagnetism in $Li_xNi_{(1-x)}O$, pub. in The Jnl. of Chemical Physics 26:973-974, Apr 57
Mechanism of conduction in Li-substituted transition metal oxides, pub. in The Jnl. of Chemical Physics 26:582-587, Mar 57
The preparation, crystallography and magnetic properties of the $Li_xCo_{(1-x)}O$ system, by W. D. Johnston, R. R. Heikes, and D. Sestrich
On the motion of positive holes in $Li_xMn_{1-x}O$, by R. C. Miller and R. R. Heikes
The stoichiometry of MnTe, by H. A. Johansen
The electrical and thermal properties of Bi_2Te_3 by C. B. Satterthwaite and R. W. Ure, Jr.

PB 160 748-2 $1.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Progress rept. no. 2 on Contract NObs-72361. 17 Mar 58, 12p.

DESCRIPTORS: *Thermoelectricity, Materials, *Semiconductors, Germanium, Indium compounds, Arsenides, Bismuth compounds, Tellurides, Selenides, Refractory materials, Resistance, Thermal conductivity, Electrical properties, Alloys.

Materials research is reported in two areas: (1) mixed valency, (2) semiconductors and semimetals. (See also PB 160 748-1)

PB 160 748-10 $2.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Progress rept. no. 10 on Contract NObs-72361. 15 Nov 58, 28p. 5 refs. Research memos. 431FD279-M2, and 431FD279-M4(412); Research rept. 431FD275-R2; AD-225 603.

DESCRIPTORS: *Thermoelectricity, *Thermoelectric generators, Generators, Design, Cooling, Semiconductors, Bismuth, Lead, Tellurides, Selenides, Chemical analysis, Resistance, Thermal conductivity, Mathematical analysis, Ships, Main propulsion plants.

Two theoretical papers are given which contribute to the mathematical design of thermoelectric power generators. The last paper is concerned with the chemical analysis of Bi, Sb, Te, and Se combinations. Such combinations are suitable for Peltier cooling and the water cooled stage of a thermoelectric generator. (Author) (See also 160 748-2)

PB 160 748-11 $7.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Progress rept. no. 11 on Contract NObs-72361. 15 Nov 58, 79p. 86 refs. Scientific papers 431FD280-P1, and 8-1038-P47; Research memo. 6-94416-3-M8.

DESCRIPTORS: *Thermoelectricity, Materials, Semiconductors, Thermal conductivity, Thermoelectric generators, Generators, Cooling, Electrons, Motion.

This report collates theoretical and experimental information of thermal conductivity. Thermal conductivity is a crucial parameter in the quest for high figures of merit in thermoelectric devices. The last paper departs somewhat from the thermal conductivity theme and discusses the more general problem of Peltier cooling at liquid nitrogen temperature. Included in the report are: A model for lattice thermal conductivity at low temperatures, by Joseph Callaway, Scientific Paper 431FD280-P1 An empirical correlation for high temperature lattice thermal conductivity, by R. W. Keyes, considerations relating to peltier cooling at 77°K, by R. W. Keyes, Research Memo 6-94416-3-M8, correlation between mobility and effective mass in semiconductors, by R. W. Keyes, Scientific Paper 8-1038-P47. (See also PB 160 748-10)

PB 160 748-12 $9.60

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Progress rept. no. 12 (Final) on Contract NObs-72361. 1 Jan 59, 115p. 13 refs. Research repts. 431FD406-R1, 8-0529-R23, and 431FD282-R5-X.

DESCRIPTORS: *Thermoelectricity, Materials, *Thermoelectric generators, Generators, Operation, Semiconductors, Inorganic substances, Electrical properties, Thermal conductivity, Measurement.

Contents:
Bibliography of reports
Summary of material parameters
Rapid measurement of thermoelectric materials under simulated generator conditions by S. J. Angello, and C. S. Duncan
Methods and apparatus for measuring the figure of merit of thermoelements by J. A. Cyphers
The etching of $Bi_2Te_xSe_{(3-x)}$ by J. W. Faust, Jr.
Arrays of inorganic semiconducting compounds, by A. J. Cornish
Optimization of the available power of a closed-cycle thermoelectric generator, by B. W. Swanson, and E. V. Somers (See also PB 160 748-11)

AD 258 601 $12.00

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Quarterly progress rept. no. 1, 11 Nov 60-11 Feb 61, on Contract NObs-84317. 11 Feb 61, 165p. 33 refs. Scientific papers no. 929-8902-P1, 123-N000-P1, and 929-8900-P2; Research rept. 929-8902-R1; Research memo. 929-8900-M2.

DESCRIPTORS: *Thermoelectricity, Thermoelectric generators, Generators, Materials, Semiconductors, Intermetallic compounds, Electrical properties, Thermocouples, Design, Electric power production, Power supplies, Thermal conductivity, Crystals, Growth.

PB 160 850 $1.10

Stanford Research Inst., Menlo Park, Calif.
THERMOELECTRIC MATERIALS, by J. W. Johnson. Bimonthly progress rept. 1 June-1 Aug 61, on Contract NObs-77017. 16 Aug 61, 3p. Rept. no. 16; SRI Proj. no. SU-2681.

DESCRIPTORS: *Thermoelectricity, *Materials, Copper compounds, Sulfides, Tellurides, Resistance, Measurement, Electrical properties, Semiconductors.

Three attempts were made to measure the resistivity of cuprous sulfide under one atmosphere of sulfur pressure. In all cases, by the time the temperature had been increased to the melting point of the system sulfur was leaking through the seals, and consequently the run was discontinued. A flowing system utilizing a mixture of hydrogen and hydrogen sulfide as a source of sulfur pressure has been constructed but has not yet been used in a determination. Compositions containing 20 and 30 mol percent cuprous sulfide, with the balance cuprous telluride, have been premelted. Conventional U-tube cells have been constructed for the determination of the Seebeck coefficient and resistivity of these compositions.

PB 160 843 $1.10

Titanium Alloy Mfg., Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS, by Merton H. Brooks. Bimonthly progress rept. no. 4, 1 July-31 Aug 60, on Contract NObs-78326. 15 Sep 60, 4p.

DESCRIPTORS: *Thermoelectricity, Materials, *Ceramic materials, Preparation, Thermal conductivity, Titanium compounds, Zirconium compounds, Dioxides, Electrical properties, Semiconductors.

Standard Series of additions of La_2O_3, $LaPO_4$, Nb_2O_5, Ta_2O_5, Sb_2O_5, SnO_2, MoO_3 have been prepared. Raw material mixes of $Li2CO3{\cdot}Tl_2O_3$ and Li_2CO_3 Bi_2O_3 have been prepared. The CeO_2, Sb_2O_5, and Nb_2O_5 Standard Series of additions to $BaTiO_3$ have been prepared. A horizontal tube furnace to provide high temperature ambient for electrical measurements has been constructed and put into operation.

PB 160 844 $1.10

Titanium Alloy Mfg. Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS, by Merton H. Brooks. Bimonthly progress rept. no. 5, 1 Sep-31 Oct 60, on Contract NObs-78326. 15 Nov 60, 4p.

DESCRIPTORS: *Thermoelectricity, Materials, *Ceramic materials, Sintering, Thermal conductivity, Resistance, Dies, Electrical properties, Semiconductors.

The new die for forming the Standard Ceramic Body has been completed and mounted on a Blackhawk Portopress equiped with double acting 20 ton rams. Sintering conditions have been determined for Standard Series of additions to the rutile form of TiO_2. The instrumentation and circuitry for measurement of resistance and Seebeck voltage at 700°C to 1200°C has been completed. (See also PB 160 843)

PB 160 851 $1.60

Titanium Alloy Mfg. Div., National Lead Co., Niagara Falls, N. Y.
THERMOELECTRIC MATERIALS, by Merton H. Brooks. Bimonthly progress rept. no. 8, 1 Mar-30 Apr 61, on Contract NObs-78326. 15 May 61, 19p.

DESCRIPTORS: *Thermoelectricity, Materials, *Ceramic materials, Synthesis, Resistance, Electrical properties, Lithium compounds, Titanates, Oxides, Semiconductors.

$Li_2CO_3 + ThO_2$, wet ball-milled 1/2 hour, dried, and calcined at 1600°F, 1800°F, and 2000°F for two hours, gave X-ray diffraction patterns for ThO_2. There was no evidence of reaction between constituents or with the container. Standard Series of additions of NiO, SnO, MgO, ZnO, ZrO_2, CeO_2, Nb_2O_5 and Ta_2O_5 to Li_2TiO_3 have been fabricated into Standard Ceramic Bodies. (See also PB 160 844)

PB 162 042 $5.60

Westinghouse Research Labs., Pittsburgh, Pa.
FIVE KILOWATT THERMOELECTRIC GENERATOR by B. W. Swanson and E. V. Somers. Bimonthly progress letter no. 1, on Contract NObs-77093. 12 May 59, 55p. 4 refs. Research rept. 431FD412-R2; AD-225 605.

DESCRIPTORS: *Thermoelectric generators, Generators, Design, Materials, Semiconductors, Bismuth compounds, Tellurides, Zinc compounds, Antimonides, Life expectancy, Thermal conductivity, Thermoelectricity.

Most of the work to date has centered around detailed design of thermoelectric material configurations and environmental checking of thermoelectric elements. Life data on Bi-Te and ZnSb have been obtained at 400°C to 1000 hours. Tests on the other materials are beginning. The curves attached give detailed thermoelectric parameter data for the materials to be used. Included in the report is an analysis of a sandwiched thermoelectric device with temperature dependent properties, Research rept. 431FD412-R2.

PB 160 748-1 $10.10

Westinghouse Research Labs., Pittsburgh, Pa.
THERMOELECTRICITY. Progress rept. no. 1 on Contract NObs-72361. 15 Jan 58, 125p. 99 refs. Scientific papers 8-0660-P3, 8-0660-P2, 8-0867-Pl, and 8-1038-P26.

DESCRIPTORS: *Thermoelectricity, *Thermoelectric generators, Generators, Materials, Semiconductors, Lithium compounds, Nickel compounds, Oxides, Transition elements, Manganese compounds, Bismuth compounds, Tellurides, Magnetic properties, Crystal structure, Electrical properties, Thermal conductivity, Ferromagnetism.

Included in this report are:
Study of Band Structure of Intermetallic Compounds by Pressure Experiments. The Thermoelectric Properties of Some Cerium Sulphide Semiconductors from 4°K to 1300°K. A Precision Apparatus for Measuring Thermoelectric Parameters at Room Temperature. (See also AD-265 328)

PB 159 161-4 $8.10

Westinghouse Research Labs., Pittsburgh, Pa.
THERMOELECTRICITY. Quarterly progress rept. no. 4 on Contract NObs-77043. 18 Nov 59, 83p. 1 ref AD-231 565.

DESCRIPTORS: *Thermoelectricity, *Generators, Direct current, *Semiconductors, Thermodynamics, Materials, Electrical properties, Thermoelectric generators.

Rapid strides were made in the field of thermoelectric power generation. This is reflected in the fact that the theoretical efficiencies in the temperature range 300 - 1075°K were increased 25% over the values of a year ago. This increase was due in part to the following: (1) improved doping techniques increased the figure of merit and the useful temperature range of the $Bi_xSb_{2-x}Te_ySe_{3-y}$ system; (2) it was recognized that the doping agent in GeTe was Ge vacancies, which led to the partial replacement of Ge by Bi as a solution for the over doping occurring at the low end of the useful temperature range; (3) the introduction of P into InAs improved the figure of merit at the low temperature end of the useful range of this material; and (4) N-type PbTe was developed in both the cast and sintered forms. Significant advances were made in materials suitable for operations up to 1500°K. Among the more interesting of these materials are the chalkogenides (S, Se, Te) of the rare earth elements. (Author)

Ordnance, Missiles, and Satellite Vehicles

NASA N62-14012 $1.60

Advanced Kinetics, Inc., Costa Mesa, Calif.
LABORATORY SIMULATION STUDIES OF OUTER SPACE. A FAST GAS VALVE FOR PLASMA RESEARCH, by Ralph W. Waniek, R. S. Lowder, and F. C. Hoh. Quarterly status rept. no. 1, 10 Apr-10 July 62, on NASA Contract NASw-427. 1962, 16p. 5 refs.

NASA N62-10679 $2.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
SATELLITE ORBITAL DATA. ORBITAL ELEMENTS FOR THE PERIOD MAY THROUGH DECEMBER, 1960, by D. V. Mechau and Beatrice Miller. 25 Oct 61, 27p. SAO Special rept. no. 78.

NASA N62-10678 $1.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
SHORT-PERIODIC OSCILLATIONS IN THE DRAG OF SATELLITE 1958 ALPHA, by Luigi G. Jacchia and Jack Slowey. Rept. on NASA Grant NsG-87-60. 24 Oct 61, 11p. 2 refs. SAO Special rept. no. 77.

NASA N62-14263 $4.60

Dunlap and Associates, Inc., Stamford, Conn.
DISPLAY REQUIREMENTS AND TECHNIQUES FOR SPACE NAVIGATION. Quarterly progress rept. no. 3, 1 Apr-30 June 62, on NASA Contract NASr-64. 2 July 62, 42p. Tech. rept. no. 61.55-3.

NASA N62-15013 $2.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
THE NASA IONOSPHERE SATELLITE PROGRAM, by J. E. Jackson and R. E. Bourdeau. 16 July 62, 30p. X-615-62-108.

NASA N62-13956 $0.50

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
A PRELIMINARY STUDY OF SOME PERIODIC ORBITS FOR MOON PROBES, by Sh-Shu Huang. July 62, 21p. 4 refs. NASA TN D-1413.

NASA N62-12901 $1.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
REVIEW OF VOLUMES 1-6, ARTIFICIAL EARTH SATELLITES, by W. N. Hess, et al. [1961] 15p. A review by specialists of the first 6 vols. (60 articles) of the cover-to-cover translation of Iskusstvennye Sputnik Zemli (Moscow).

NASA N62-12484 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE APPLICATION OF OPTICAL SENSORS FOR LUNAR AND PLANETARY SPACE VEHICLES, by John R. Scull. Rept. on NASA Contract NASw-6. [1962] 27p. 11 refs.

NASA N62-11487 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DETERMINATION OF RADIATION CONFIGURATION FACTORS, Roy Scott Hickman. Rept. on NASA Contract NASw-6. 21 Dec 61, 19p. 10 refs. JPL-TR-32-154.

Included in the report are:

The Effect of Freezing Conditions on the Thermoelectric Properties of $BiSbTe_3$ Crystals
Considerations Concerning Thermoelectric Materials Having the Thorium Phosphide Structure
Some Fundamental Properties of ZnSb
Measurement of Thermal Conductivities of Liquid Thermoelectric Materials (Molten Cuprous Sulfide) From 1000° to 1800°c
Materials Requirements for Segmented Thermoelectric Generators
The Design of Thermocouples for Electrical Power Production (See also AD-259 564)

PB 160 838-1 $12.00

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Quarterly progress rept. no. 1 on Contract NObs-78365. 11 Feb 60, 164p. 24 refs. Scientific papers 10-0509-3-P5, and 401FR800-P1; Research memos. 431FD413-M2, and 12-1401-1-M1; Research rept. 408FR801-R1; AD-244 959.

DESCRIPTORS: *Thermoelectricity, Generators, Direct current, *Semiconductors, Thermodynamics, Materials, Electrical properties, Thermoelectric generators.

The efficiency graphs showed that the theoretical device efficiency increased by slightly more than 11%. The net increase in efficiency since January 1, 1959 was 33%. The recent increase of 11% is due to (1) an improvement in properties of Ge-Bi-Te due to better preparational techniques and (2) the inclusion of the cerium sulfide. In a previous report the subject of thermoelectric efficiencies was treated; the discussion being limited to the case where the thermoelectric arm had only a single material. The subject of multi-element or segmented arms is treated here. Under certain conditions, the arm of an additional segment may actually degrade the efficiency. Initial discussions on the problem of producing an arbitrary variation in doping concentration along an element are presented. (Author)

AD-265 328 $12.50

Westinghouse Research Lab., Pittsburgh, Pa. THERMOELECTRICITY. Quarterly progress rept. no. 2, 11 Feb-11 May 61, on Contract NObs-84317. 11 May 61, 171p. 27 refs. Scientific papers 23-929-8902-P4, 23-929-8902-P3, 23-929-8902-P2, 125-5000-P1, and 401FR9810-P1; Research memo. 25-929-8091-M1.

DESCRIPTORS: Materials, *Semiconductors, *Intermetallic compounds, *Thermoelectricity, Power supplies, Cobalt compounds, Antimonides, Arsenides, Rare earth compounds, Bismuth compounds, Gallium compounds, Indium compounds, Thallium compounds, Manganese compounds, Selenides, Pyrites, *Alloys, Thermal conductivity, Electrical properties, Crystal structure, Resistance.

Included in the report are:
A Study of Substituted MnTe
The MnTe-MnSe System
Crystal Structures in the $OsTe_{2-x}Sb_x$ System
Phase Diagram for the Pseudo Binary System Ag_2Te-Sb_2Te_3
Fluid Flow Control During Solidification. Part II: Programmed Solute Distribution
The Preparation and Thermoelectric Properties of a Bi-Sb-Te-Se Alloy.
(See also AD-258 601)

AD-259 565 $10.10

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Quarterly progress rept. no. 3 on Contract NObs-78365. 1960, 130p. 76 refs. Scientific papers 414FR801-P1, 408FR800-P3, and 414FR803-P1.

DESCRIPTORS: *Thermoelectricity, Thermocouples, Thermodynamics, Generators, Power supplies, Thermal conductivity, Electrical properties, Materials, Tests, *Semiconductors, Impurities, Measurement, Alloys

It has been suggested that a compound having an anisotropic effective mass tensor or one in which the anions or cations occur in clusters might have a high figure of merit. A number of these compounds have been prepared and their electrical properties partially investigated. Although none of the compounds investigated were as good as the materials shown on the efficiency charts, it appears that a number of them would give a z of $\sim .5 - 1.0 \cdot 10^{-3}$ at room temperature if at optimum doping. Another large group of compounds which appears to hold some promise as thermoelectric elements are those compounds having cubic or near cubic structures. Included in this group are some of the better materials i.e. GeTe, PbTe and $AgSbTe_2$. A survey of these materials was started with particular emphasis on those substances which have not been prepared before. The work on the proven materials listed on the efficiency charts has been continued. One result was the improvement of the efficiency of MnTe by the discovery that up to 6% Li will dissolve in MnTe and give optimum doped material. (Author) (See also PB 160 838-1)

AD-265 365 $10.10

Westinghouse Research Labs., Pittsburgh, Pa. THERMOELECTRICITY. Quarterly progress rept. no. 3, 11 May-11 Aug 61, on Contract NObs-84317. 11 Aug 61, 124p. 33 refs. Scientific papers 929-8904-P2, and 929-8900-P4; Research memo. 929-8900-M9.

DESCRIPTORS: Materials, *Semiconductors, *Intermetallic compounds, *Thermoelectricity, Power supplies, Thallium compounds, Antimony compounds, Bismuth compounds, Germanium compounds, Tin compounds, Lead compounds, Tellurides, Zinc compounds, Antimonides, Niobium compounds, Pyrites, Cerium compounds, Sulfides, Gold compounds, Phosphides, Transport properties, Pressure, Hydrostatic pressure, Electrical properties, Test equipment, High temperature research, Measurement, Thermocouples, Resistance, Hall effect.

NASA N62-13478 $1.60

Manned Spacecraft Center, National Aeronautics and Space Administration, Houston, Tex.
PROJECT MERCURY WATER LANDING PROBLEMS, by Rodney G. Rose and Peter J. Armitage. [1961] 18p.

NASA N62-14273 $4.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
SPACE VEHICLE ATTITUDE STABILIZATION USING PULSE-MODULATED JET CONTROL, by David N. Schultz. 13 July 61, 41p. MTP-M-G&C-61-32.

AD-282 995 $1.00

Michigan U., Ann Arbor.
FLIGHT SIMULATION OF ORBITAL AND REENTRY VEHICLES. PART III: AERODYNAMICS INFORMATION REQUIRED FOR SIX DEGREES OF FREEDOM SIMULATION, by H. Buning. Rept. June 60-Nov 61, on Training Equipment, Simulators, and Techniques for Air Force Systems, Contract AF 33(616)5664. Dec 61, 33p. 10 refs. ASD Technical rept. 61-171. (III).

DESCRIPTORS: *Re-entry vehicles, *Satellite vehicles, Atmosphere entry, *Flight simulators, Simulation, *Aerodynamics, Hypersonics, Supersonics

A survey of the aerodynamic information required for a simulator for a glide reentry vehicle is presented. Various phases of the flight are considered: hypersonic reentry, hypersonic-supersonic glide, and supersonic-transonic-subsonic approach and landing. Accuracy requirements and origin of aerodynamic information are briefly discussed. Aerodynamic parameters are defined, and the dependence of aerodynamic coefficients on these parameters is outlined. Special emphasis is placed on a technique for generating functions of two or three independent variables and some sample calculations are presented. (Author)
(See also AD-269 283)

NASA N62-11442 $1.60

Michigan U., Ann Arbor.
TELEMETER FAILURE ON NIKE-CAJUN 10.57UA SIMULATION TESTS. Quarterly progress rept. no. 8, 1 Sep-30 Nov 61, on Contract NASw-138. 12 Jan 62, 12p. ORA rept. no. 03598-8-P.

NASA N62-14139 $1.60

Minneapolis-Honeywell Regulator Co., Minn.
STUDY OF SELF-EVALUATING STATE VECTOR CONTROL WITH APPLICATIONS TO FLEXIBLE LIQUID-FUELED AERIAL AND SPACE VEHICLES, by C. R. Stone, F. B. Smith and others. Quarterly progress rept. no. 1, 19 Mar-19 June 61, on Contract NASr-27. 30 June 61, 19p. 12 refs. MH Aero-1529-QR1.

NASA N62-13657 $1.60

Minneapolis-Honeywell Regulator Co., Minn.
STUDY OF SELF-EVALUATING STATE VECTOR CONTROL WITH APPLICATIONS TO FLEXIBLE LIQUID-FUELED AERIAL AND SPACE VEHICLES, by F. B. Smith, E.B. Lee and others. Quarterly progress rept. no. 2, 19 June-19 Sep 61, on Contract NASr-27. 26 Sep 61, 15p. 7 refs. MH MPG Rept. 1529-QR2.

NASA N62-13718 $1.60

MSA Research Corp., Callery, Pa.
EXPLORATORY STUDY OF POTASSIUM AND SODIUM SUPER-OXIDE FOR OXYGEN CONTROL IN MANNED SPACE VEHICLES, by C. A. Palladino and R. A. Spencer. Quarterly progress rept. no. 6, Oct-Dec 60, on NASA Contract NASw-90. 24 Feb 61, 16p. MSAR-61-21.

NASA N62-13701 $8.10

National Aeronautics and Space Administration, Washington, D. C.
NASA ENVIRONMENTAL TESTING, SIMULATION AND TRAINING FACILITIES IN SUPPORT OF LARGE VEHICLES AND SPACECRAFT PROGRAMS. 12 Apr 62 88p. 1 ref

NASA N62-14124 $4.60

National Aeronautics and Space Administration, Washington, D. C.
NOTES OF THE COSTS OF THE UNITED STATES SPACE PROGRAM, by Addison M. Rothrock. 13 Feb 62, 41p.

NASA N62-13635 $10.10

National Aeronautics and Space Administration, Washington, D. C.
STATEMENT OF MORTON J. STOLLER, DIRECTOR, OFFICE OF APPLICATIONS, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, BEFORE THE COMMITTEE ON AERONAUTICAL AND SPACE SCIENCES, UNITED STATES SENATE [Fiscal Year 1963 Program], by Morton J. Stoller. [1962] 126p.

NASA N62-10200 $4.60

Rand Corp., Santa Monica, Calif.
VELOCITY REQUIREMENTS FOR THE CORRECTION OF A 24-HOUR ORBIT, by J. H. Hutcheson. Rept. on NASA Contract NASr-21(02). Mar 62, 32p. 3 refs. Memo. RM-3045-NASA.

NASA N62-13905 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. A METHOD FOR PREDICTING THE EFFICIENCY OF SOLAR CELL POWER SYSTEMS OUTSIDE THE EARTH'S ATMOSPHERE, by John A. Zoutendyk. Rept. on NASA Contract NAS7-100. 10 Apr 62, 17p. 4 refs. Rept. JPL-TR-32-259.

NASA N62-10267 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. SCIENTIFIC EXPERIMENTS FOR RANGER 3, 4, AND 5. Rept. on NASA Contract NASw-6. 5 Dec 61, 25p. 10 refs. JPL-TR-32-199.

NASA N62-13914 $8.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. SPACE PROGRAMS SUMMARY NO. 37-15, VOLUME VI FOR THE PERIOD MARCH 1, 1962 TO JUNE 1, 1962. SPACE EXPLORATIONS PROGRAMS AND SPACE SCIENCES. Rept. on Contract NAS7-100. 30 June 62, 94p. refs.

NASA N62-13906 $2.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. USE OF CARBON ARC LAMPS AS SOLAR SIMULATION IN ENVIRONMENTAL TESTING, by J. E. Maclay and R. J. Goggia. Rept. on NASA Contract NAS7-100. 4 June 62, 29p. 7 refs. Rept. JPL-TR-32-271.

NASA N62-13980 $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. THE ELECTROSTATIC AND ELECTROMAGNETIC DRAG FORCES ON A SPHERICAL SATELLITE IN A RAREFIED PARTIALLY IONIZED ATMOSPHERE, by Frank Hohl and George P. Wood. [1962] 39p. 15 refs.

NASA N62-13947 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. NUMERICAL ANALYSIS OF THE TRANSIENT RESPONSE OF ADVANCED THERMAL PROTECTION SYSTEMS FOR ATMOSPHERIC ENTRY, by Robert T. Swann and Claud M. Pittmann. July 62, 40p. 11 refs. NASA TN D-1370.

NASA N62-14070 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. STUDY OF UMBRELLA-TYPE ERECTABLE PARABOLOIDAL SOLAR CONCENTRATORS FOR GENERATION OF SPACECRAFT AUXILIARY POWER, by William D. Nowlin and Harold E. Benson. Aug 62, 44p. 7 refs. NASA TN D-1368.

NASA N62-13957 $5.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. TECHNIQUES FOR SIMULATION AND ANALYSIS OF SHOCK AND VIBRATION ENVIRONMENTS OF SPACE FLIGHT SYSTEMS, by George W. Brooks. [1962] 52p. 10 refs.

NASA N62-13946 $1.00

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. TEMPERATURE CONTROL OF THE EXPLORER IX SATELLITE, by Charles V. Woerner and Gerald M. Keating. July 62, 39p. 9 refs. NASA TN D-1369.

NASA N62-13943 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio. ANALYTICAL INVESTIGATION OF RECIRCULATION-PUMP AND RADIATOR-AREA REQUIREMENTS FOR FLASH VAPORIZATION IN A TURBOELECTRIC SPACE POWER SYSTEM, by Arthur J. Glassman. July 62, 27p. 7 refs. NASA TN D-1283.

NASA N62-13627 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio. APPLICATION OF NUCLEAR ROCKET ENGINES TO MANNED LUNAR MISSIONS, by Hugh M. Henneberry and Robert J. Lubrick. [1961] 29p. 5 refs.

NASA N62-14064 $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio. APPROXIMATE ANALYSIS OF G LOADS AND HEATING DURING ATMOSPHERIC ENTRIES AND PASSES WITH CONSTANT AERODYNAMIC COEFFICIENTS, by Roger W. Luidens. July 62, 49p. 10 refs. NASA TN D-1280.

NASA N62-13933 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio. EXPERIMENTAL INVESTIGATION OF WATER-ABSORBENT MATERIALS AS POSSIBLE HEAT SINKS FOR HYPERSONIC AND REENTRY VEHICLES, by Robert P. Dengler and Reeves P. Cochran. July 62, 24p. 2 refs. NASA TN D-1287.

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

PB 159 807 $1.10

Agricultural Research Service, Albany, Calif.
RADIATION PRESERVATION OF POULTRY PRODUCTS, by Hans Lineweaver. Rept. no. 3 (Final) 1 June 59-28 Feb 61. [1961] 7p. File no. S-569.

DESCRIPTORS: Food, *Meat, *Chickens, Taste, Odors, Preservation, *Radiation effects, Heat treatment.

The adverse odor, flavor, and color changes occurring in enzyme-inactivated chicken irradiated at 4.6 rad can be significantly reduced by appropriate procedures. Odor and flavor changes can be reduced by selection of an appropriate cooking method. Odor, as reported by others, is markedly reduced by the incorporation of charcoal packets in the containers during storage at elevated temperatures. Deep-fat frying was more effective in reducing off flavors than other cooking methods tested. The objectionable pink color observed in irradiated chicken is a change that develops during storage of the irradiated chicken at elevated temperatures, and not a change occurring during the irradiation process.

PB 159 498 $1.10

American Inst. of Baking, Chicago, Ill.
INVESTIGATION OF CHEMICAL SUBSTANCES PRODUCED BY FERMENTATION AND BAKING IN BREAD PRODUCTION, by W. G. Bechtel. Rept. no. 12 (Final) 27 Dec 56-26 Dec 58, on Contract DA 19-129-qm-833. [1958] 8p. 4 refs. File no. C-316.

DESCRIPTORS: *Bread, *Fermentation, *Aldehydes, Carbonyl radicals, Furfurals, *Ethanols, *Taste, Food.

Quantitative estimates have been made of furfural, acidity, total dicarbonyls, ethanol, diacetyl and pyruvaldehyde in the volatiles from fresh bread. Other compounds identified could not be estimated. These data were used to prepare several mixtures which might be used as synthetic flavoring agents. It has been shown that the volatiles from bread of good quality, added to a chemically-leavened dough, do not impart any character to the product which makes it either more or less palatable. The permeation of slices of chemically-leavened bread by the vapors of bread volatiles seemed to impart a flavor improvement, but none of the synthetic mixtures prepared was able to impart any improvement in an analogous manner. Panelists could distinguish easily between treated and untreated slices, but there was no clear preference for either type. (Author)

PB 158 231 $8.10

American Meat Inst. Foundation, Chicago, Ill.
ROLE OF WATER AND OXYGEN IN THE DETERIORATION OF FREEZE-DRIED MEAT, by W. A. Landmann. Rept. no. 8 (Final) 5 Dec 58-4 Dec 60, on Contract DA 19-129-qm-1333. [1960] 81p. 20 refs. File no. A-328.

DESCRIPTORS: *Water, *Oxygen, *Deterioration, *Meat, *Freeze-drying, Storage, Temperature, Preservation.

Production of freeze-dried fresh and cooked meat at various moisture levels, methods for studying deteriorative changes on storage, and results of analyses are reported. Statistical treatment of data shows moisture and temperature cause greatest deteriorative changes. Oxygen level has little or no effect. (Author)

PB 159 826 $2.60

Evans Research and Development Corp., New York.
FORMULATION OF FREE FLOWING DRY SPICE CONDIMENTS AND SAUCE MIXTURES, by Kurt S. Konigsbacher. Rept. no. 4 (Final) 1 Jan 59-11 Mar 60, on Contract DA 19-129-qm-1357. [1960]. 24p. 3 refs. File no. C-321; AD-237 844.

DESCRIPTORS: *Spices, *Dehydrated substances, Tests, Acceptability, Packaging, *Condiments, *Food, *Taste, Dehydration.

Many experimental formulations of free-flowing powdered catsup, prepared mustard, Worcestershire sauce, meat sauce, sandwich spreads, and salad dressings were prepared and evaluated. The ratings given to the formulations of spice condiments and sauce mixtures improved steadily as the work progressed. (Author)

PB 159 150 $6.60

Florida State U., Tallahassee.
STABILIZING IRRADIATED MEATS AGAINST OXIDATIVE CHANGES DURING STORAGE, by Betty M. Watts. Rept. no. 8 (Final) 1 Oct 58-30 Sep 60, on Contract DA 19-129-qm-1321. 69p. 84 refs. File no. S-587; AD-252 830.

DESCRIPTORS: *Meat, *Oxidation, Storage, *Radiation effects, *Pork, *Lipids, Fatty acids, Odors, Test methods, *Beef, Malonaldehydes, Determination, Chemical analysis, *Antioxidants, Preservation, *Food.

The oxidation of the cellular lipids in lean cooked meats was investigated as a contributing factor in the flavor deterioration of irradiated cooked meats. An improved distillation procedure was developed and compared with other methods in current use. The method was used to follow the oxidation of pure, unsaturated fatty acids under controlled conditions. Lipid oxidation as measured by the TBA number occurred in the lean meat of all meat animals after moderate cooking (temperatures of 60-90 C). There was less subsequent oxidation after prolonged cooking at high temperatures. Exposed slices of primal

NASA N62-14687 $4.60

Space Technology Labs., Inc., Los Angeles, Calif.
CHARACTERISTICS OF ENERGY ABSORBING MATERIALS FOR A LUNAR SOFT LANDING VEHICLE, by M. Feigen, D. Fitzgibbon, and E. Burcham Rept. on NASA Contract. 18 Aug 61, 49p. 8 refs. EM-11-17; Rept. 9753-0001-MU-000.

PB 159 254 $1.60

Space Technology Labs., Inc., Redondo Beach, Calif.
EXPLODING WIRE DRIVEN SHOCK WAVES, by G. L. Clark, J. J. Hickey and others. 1 Dec 61, 12p. 5 refs. Rept. no. 9844-0035-RU-000.

DESCRIPTORS: *Silver wire, Wire, Exploder mechanisms, *Explosions, *Shock waves, Propagation, Photographic analysis, High speed photography.

The explosion of fine silver wires by the fast discharge of a low inductance capacitor has been photographed with an STL Model C Image Converter Camera operated as a streak camera. All of the previously observed shock waves and contact surfaces have been clearly recorded. In addition the large effective f/0.5 aperture of the camera due to fast optics, 50x1 light amplification, and 0.5 millisecond phosphor persistence has allowed the initial shock wave in air at atmospheric pressure to be photographed by its own luminosity. In addition photographs of both radially or circumferentially propagating shock waves, depending on dwell duration, have been recorded during the second conduction.

NASA N62-14626 $1.60

Stanford U., Calif.
BASIC STUDIES IN SPACE VEHICLE ATTITUDE CONTROL, by I. Flugge-Lotz and Robert H. Cannon, Jr. Semi-annual status rept. no. 2, on NASA Grant NsG-133-61. May 62, 13p. 13 refs.

NASA N62-14622 $18.50

Standard U., Calif.
THE LARGE ATTITUDE MOTIONS AND STABILITY, DUE TO GRAVITY, OF A SATELLITE WITH PASSIVE DAMPING IN AN ORBIT OF ORBITRARY ECCENTRICITY ABOUT AN OBLATE BODY, by Daniel B. DeBra. Rept. on NASA Grant NsG-133-61. May 62, 292p. 55 refs. SUDAER-126.

NASA N62-10895 $4.60

Stanford U., Calif.
SOME BASIC RESPONSE RELATIONS FOR REACTION-WHEEL ATTITUDE CONTROL, by Robert H. Cannon, Jr. · Rept. on NASA Grant NsG-133-61 and Contract AF 33(616)6674. 1961, 46p. 11 refs.

NASA N62-13820 $5.60

Syracuse U. Research Inst., N. Y.
FRETTING AND DRY FRICTION UNDER SPACE CONDITIONS, by Douglas V. Keller, Jr., and T. Spalvins. Final rept. on Contract DA 30-069-ORD-2956. 30 June 61, 58p. 63 refs. S. U. R. I. Rept. MET. E. 764-616F.

Sanitation and Safety Engineering

PNE-128F $0.50

Beers, Roland F., Inc., Alexandria, Va.
SUMMARY OF PREDICTIONS AND COMPARISON OF OBSERVED EFFECTS OF GNOME ON PUBLIC SAFETY. Final rept. on Plowshare Program, Proj. Gnome, Contract AT (29-2)1163. 13 Apr 62, 16p. 25 refs.

WT-1701 $2.00

Holmes and Narver, Inc., Los Angeles, Calif.
PHYSICAL DAMAGE SURVEY OF AEC TEST STRUCTURES, by R. A. Cameron, Jr., and P. H. Huff. 28 May 62, 92p. 4 refs.

WT-1454 $3.50

Ammann and Whitney, New York, N. Y.
TEST OF GERMAN UNDERGROUND PERSONNEL SHELTERS, by Edward Cohen and A. Bottenhofer. Operation Plumbbob. 25 June 62, 266p. 5 refs.

NASA N62-14710 $1.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STUDY OF PURIFICATION OF WATER FROM BIOLOGICAL WASTE, by J. J. Konikoff. Quarterly progress rept. no. 5 on Contract NASw-127. Aug 61, 5p.

NASA N62-14708 $1.10

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STUDY OF PURIFICATION OF WATER FROM BIOLOGICAL WASTE, by J. J. Konikoff. Quarterly progress rept. no. 6 on Contract NASw-127. Oct 61, 4p.

Office of Technical Services, Dept. of Commerce, Washington, D. C.
WATER POLLUTION AND WATER PURIFICATION (INCLUDING RADIOACTIVE CONTAMINATION AND DECONTAMINATION). July 62, 13p. 179 refs. OTS Selective Bibliography SB-498.
Order from OTS $0.10 OTS SB-498

DESCRIPTORS: Water, *Water supplies, *Contamination, Radiological contamination, Decontamination, Impurities, *Purification, *Bibliography.

PB 159 470 $7.60

NRC Equipment Corp., Newton Highlands, Mass.
ECONOMIC STUDY OF FOOD PRESERVATION METHODS. Rept. no. 4 (Final) 7 Jan-5 Sep 59, on Contract DA 19-129-qm-1353. 4 Nov 59, 75p. File no. A-330.

DESCRIPTORS: *Food, Packaging, *Preservation, *Freeze-drying, *Refrigeration systems, *Economics, Military rations,

The objective of this assignment has been to establish comparative total costs for providing one million daily servings of fresh, frozen, canned, and freeze-dehydrated beef to five points on the globe. Fresh, frozen, and canned beef processing represent current commercial practice, while freeze drying represents a technically feasible technique that has not yet been used in large commercial production. Therefore, the majority of the effort has been expended on an engineering approach and cost analysis of freeze drying.

PB 160 481 $3.60

Oregon State [U.] Agricultural Experiment Station, Corvallis.
A CORRELATION IN RADIATION STERILIZED FOODS OF THE CHEMICAL CHANGES ASSOCIATED WITH THE CHARACTERISTIC FLAVOR DEVELOPMENT, by J. S. Butts. Rept. no. 6 (Final) 1 July 56-30 June 58, on Contract DA 19-129-qm-762. [1958] 38p. 42 refs. File no. S-502.

DESCRIPTORS: *Food, *Radiation effects, *Taste, Pigments, Malonaldehydes, Preservation, Meat, *Aldehydes.

Two substances, formed upon irradiation ground beef, were found to give the red color with the thiobarbituric acid test. These were the dialdehydes, malonaldehyde and glyoxal. Identification was based on paper chromatography and spectrophotometric data. Pigment structure determinations have not been successful. Reaction with the aldehyde was shown to occur at the C-5 position of the thiobarbituric acid. Multiple products were found in a glyoxal-TBA model system. Two red products were detected and studied. Only one of these types corresponds to the glyoxal pigment formed from irradiated beef. There is more glyoxal pigment than malonaldehyde pigment formed in irradiated beef. A water soluble fluorescent material has been found to occur in irradiated meats. Increasing with increasing radiation. It is stable to heating and freezing but partly dializable. Concentration of the material is possible. Data to the present time tends to implicate a Maillard type reaction. (Author)

Packaging

PB 158 415 $1.10

Ekco-Alcoa Containers, Inc., Wheeling, Ill.
DEVELOPMENT OF CONTAINERS FOR IRRADIATED FOODS, by R. O'Brien. Rept. no. 2 (Final), 21 Jan 57-20 Jan 59, on Investigation of the Effects of Irradiation on Foods Packaged in Hermetically Sealed Aluminum Foil Containers. [1959] 5p. File no. S-733; AD-239 578.

DESCRIPTORS: *Containers, Laminates, Aluminum, *Foils, Seals, *Plastic coatings, Packaging, Food, *Radiation effects.

Evaluation of the formability, heat sealability, and corrosion resistance of eight combinations of polyester film stretch-laminated to foil by heat and pressure resulted in the following findings: (1) Polyester to foil laminates can be formed into smoothwall aluminum foil containers, but the stresses created in the forming operation result in clouding and crazing of the polyester film in erratic patterns. (2) Covers and containers made from these laminates can be hermetically heat sealed and permit satisfactory peel-off of the sealed cover. There was, however, constant delamination of the polyester film from the seal areas of the covers and the container flanges, resulting in ragged remnants of film in these areas. (3) These laminates showed poor corrosion resistance compared to presently used protective coatings, despite the fact that they were from three to twelve times thicker than present coating coatings. This corrosion susceptibility is probably due to discontinuities in the polyester film resulting from deficiencies in the stretch-laminating process. (Author)

PB 159 808 $1.10

Monsanto Chemical Co., Springfield, Mass.
TO INVESTIGATE THE EFFECTS OF IONIZING RADIATION ON POLYSTYRENE AND OTHER PLASTICS ALONE AND IN CONJUNCTION WITH SIMULATED FOOD SYSTEMS, by Charles T. Hathaway and Manuel F. Drumm. Rept. no. 6 (Supplement to final), 28 June 60-27 June 61, on Evaluation of Films for Irradiation Packaging of Foods. [1961] 6p. 3 refs. File no. S-744.

DESCRIPTORS: *Radiation effects, Ionization, *Plastic films, *Styrenes, *Synthetic rubber, Pentadienes, Food, Packaging.

Irradiation of rubber modified polystyrene containers showed little increase in odor as a result of treatment with 6 Megarad. Though the initial odor was greater than polystyrene, some control might be possible. These modified polymers are far more serviceable as packaging containers in conventional applications. (Author)

PB 158 208 $1.60

Sutherland Paper Co., Kalamazoo, Mich.
PAPERBOARD CONTAINERS FOR IRRADIATED FOODS, by G. G. Rumberger. Rept. no. 4 (Final) 10 Sep 58-9 Sep 60, on Effect of Ionizing Radiation on Materials for Carton Construction. [1960] 15p. File no. S-749.

DESCRIPTORS: *Radiation effects, Gamma rays, Beta particles, Dosage, Sterilizers, Pasturization, Food, Packaging, *Containers, *Fiberboard, *Inks, Colors.

A typical packaging grade fiberboard has been exposed to gamma and beta radiation at both pasteurization and sterilization doses. Change of color, lowering of strength, and lowering of tear resistance are noted at sterilization doses. At pasteurization doses, there is little or no effect. Commercial grade inks are resistant to color change even at sterilization dosages. (Author)

cuts, cooked whole, developed higher TBA numbers than ground meat. In general, lipid oxidation as measured by TBA numbers correlated well with rancid odor ratings. A theory is presented to explain differences in the catalytic activity of various heme pigments. (Author)

PB 158 194 $14.00

Georgia Experiment Station, Experiment.
LONG-TERM STORAGE OF OPERATIONAL RATIONS, by J. G. Woodroof. Rept. no. 30 (Final) 24 June 53-16 Aug 58, on Contract DA 44-109-qm-1511. [1958] 208p. File no. R-301.

DESCRIPTORS: *Military rations, *Food, *Storage, Temperature, *Containers, Taste, Freezing, Bread, Cereals, Meat, Fishes, Vegetables, Preservation.

A research project on long-term storage of operational rations was conducted. Included were seven bakery and cereal products, six confections, eight dairy products, 14 meat and fish products, three vegetables and seven miscellaneous products. The storage conditions were: -20°F., 0°, 32°, 47°, 70° (with 50 percent and 90 percent r.h.), and 100° (with 50 percent and 90 percent r.h.). Examinations were made at six-months intervals; and included sensory evaluations, physical and chemical changes in the products, and the condition of the containers.

PB 158 421 $8.10

Illinois Inst. of Tech., Chicago.
ENGINEERING STUDIES ON THE FREEZE DRYING OF FOODS, by R. E. Peck. Rept. no. 4 (Final) 1 Jan 59-14 Jan 60, on Contract DA 19-129-qm-1366. June 60, 90p. 28 refs. File no. A-329.

DESCRIPTORS: *Food, *Freeze-drying, Vegetables, Fruits, Meat, Dehydration, *Dehydrated substances.

Various foods containing natural moisture were frozen. The frozen products were then dried by sublimation of ice at low pressures in a Vacudyne freeze-dryer located at QMF-CI. Weight loss as a function of time was recorded. The results obtained from all of the products dried were correlated by a single semi-empirical equation. This equation expressed the drying time as an explicit function of the moisture content of the food product. (Author)

PB 159 499 $1.60

Little, Arthur D., Inc., Cambridge, Mass.
SURVEY OF MODEL BROWNING SYSTEMS FOR BREAD AROMA COMPONENTS, by J. H. Moriarty. Rept. no. 8 (Final) 23 Sep 58-23 Sep 60, on Contract DA 19-129-qm-1292. 14 Nov 60, 11p. File no. C-320; AD-254 712.

DESCRIPTORS: *Bread, *Food, *Odors, Preparation, *Dry food mixes, Production, Taste, Dehydration, Flour, Hydrolysis, *Amino acids, Urea.

An investigation of browning systems was continued for bread aroma components. A working method has been devised for the laboratory preparation of a browning reaction flavor enhancer for the Quartermaster instant bread mix. Air-drying and spray-drying techniques have been explored and the latter has been established as a feasible method for obtaining the cottonseed hydrolysate in powdered form. Further work has included the flavor evaluation of the instant bread containing either ornithine or urea as compounds being structurally similar to the amino acid arginine. A final set of experiments has included the flavor evaluation of enhanced instant bread prepared with and without the addition of the amino acids alanine, leucine, isoleucine, and valine. (Author)

PB 158 207 $7.60

Massachusetts Inst. of Tech., Cambridge.
DEVELOPMENT OF TEST METHODS TO DETERMINE ADEQUACY OF SMOKEHOUSE TREATMENT OF SMOKED MEATS, by B. E. Proctor. Rept. no. 6 (Final) 6 June 58-5 June 59, on Chemical and Physical Procedures for Defining Quantitatively the Degree of Smoking of Meat Products, Contract DA 19-129-qm-1207. [1959] 77p. 16 refs. File no. A-327.

DESCRIPTORS: *Food, Processing, *Meat, Smokes, *Taste, Phenols, Formaldehyde, Acetones, Carbonyl radicals.

Various methods for the quantitative estimation of compounds deposited in meats during smoking have been evaluated. The recovery of volatile carbonyl compounds was attempted, but negligible quantities of 2, 4-DNPH derivatives were found in the condensate. Colorimetric estimation of acetone and formaldehyde in smoked meat extracts was unsuccessful. The concentration of formaldehyde in extracts of smoked ham fat was too low to be measured polarographically. The Folin-Ciocalteau method and the formation of azo dyes were found to be sensitive to phenolic compounds present in unsmoked meat and fat. The latter method may, however, be suitable for the preparation of derivatives suitable for chromatographic separation and identification. The 4-aminoantipyrene method, when employed without chloroform extraction, was less sensitive to the phenols of smoked meat than were the other two methods studied. Phenol determinations were performed on pork bellies smoked for periods of time between eight and twenty-four hours. Both cylindrical samples and end slices were used. The relative advantages of both sampling methods are discussed.

SAN-1020 $2.00

National Canners Association Research Foundation, Washington, D. C.
APPLICATION OF RADIOCHEMISTRY TECHNIQUES IN FOOD PROCESSING RESEARCH. PART I. RADIOISOTOPIC TRACER TECHNIQUES FOR DETECTION AND MEASUREMENT OF DETERGENT RESIDUES ON WASHED FOOD PRODUCTS, by Walter A. Mercer. Annual rept. on Contract AT(04-3)-296. 6 Apr 62, 91p. 2 refs.

NASA N62-14067 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
IGNITION OF A HYDROGEN-OXYGEN ROCKET ENGINE BY ADDITION OF FLUORINE TO THE OXIDANT, by R. James Rollbuhler and David M. Straight. July 62, 22p. 10 refs. NASA TN D-1309.

NASA N62-13601 $8.60

Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala.
INFLUENCE OF WEIGHT PARAMETERS ON THE PROPULSION REQUIREMENTS OF ORBIT-LAUNCHED VEHICLES, by Dietrich W. Fellenz and Ronald J. Harris. 29 May 62, 100p. 15 refs. MTP-F&VE-F-62-2.

NASA N62-14601 $7.60

United Aircraft Corp., East Hartford, Conn.
MISSION CAPABILITIES OF ION ENGINES USING SNAP-8 POWER SUPPLIES. PHASE I—SUMMARY REPORT, by T. N. Edelbaum, W. R. Fimple and others. Rept. on NASA Contract NAS5-935. Aug 61, 75p. 12 refs. Rept. R-2297-1.

Machine Parts and Mechanisms

DC-59-9-154 $3.60

General Electric Co., Cincinnati, Ohio.
DESIGN CALCULATIONS FOR TWO TEST REMOTELY OPERABLE QUICK DISCONNECTS, by J. J. Keim. 21 Sep 59, 35p. 5 refs.

NASA N62-14618 $4.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THEORY AND DESIGN DATA FOR CONTINUOUS FILM, SELF-ACTING JOURNAL BEARINGS OF FINITE LENGTH, by Harold G. Elrod, Jr. and Stanley B. Malanoski. Interim rept. on Contract Nonr-2342(00). June 62, 48p. 12 refs. Rept. I-A2049-17, suppl. to I-A2048-13.

NASA N62-11079 $3.60

Marlin-Rockwell Corp., Jamestown, N. Y.
METHOD OF PRODUCING IMPROVED BEARING COMPONENTS BY ELIMINATION OR CONTROL OF FIBER ORIENTATION, INCLUDING MAGNETIC ANALYSIS, by D. R. Wensing, S. Hujber, and W. G. Burgett. Quarterly rept. no. 11, 16 Dec 61-15 Mar 62, on Contract NASw-72. 29 Mar 62, 16p.

MATERIALS

NASA N62-13663 $6.60

Lockheed Nuclear Products, Marietta, Ga.
EFFECT OF NUCLEAR RADIATION ON MATERIALS AT CRYOGENIC TEMPERATURES, by A. W. Liebschutz. Quarterly progress rept. no. 4, Apr-June 61, on Contract NASw-114. [1961] 68p. Rept. NR-126.

PB 159 769 $5.60

National Aeronautical Establishment (Canada).
AN ANALYTICAL INVESTIGATION OF THE PROSPECT OF REDUCING LOGGING COSTS IN CANADA BY THE USE OF HELICOPTERS, by A. D. Wood. Jan 62, 56p. 8 refs. Aeronautical rept. LR-326; NRC no. 6714.

DESCRIPTORS: *Wood, *Trees, Transportation, Costs, *Helicopters, Economics, Canada.

The costs involved in using helicopters for logging are analyzed and a comparison is made with typical logging costs using conventional methods in Eastern and Western Canada. Economies are shown to be possible only for very short hauls and under circumstances in which the helicopter is able to obviate the need for most of the facilities associated with conventional logging. The variables which influence helicopter operating costs are examined and the extent of any reduction in costs in the foreseeable future is predicted. (Author)

NASA N62-10783 $7.60

Pratt and Whitney Aircraft, East Hartford, Conn.
THE DETERMINATION OF THE EMISSIVITY OF MATERIALS. Progress rept. [no. 1] 1 July-30 Sep 60, on NASA Contract NASw-104. [1960] 73p. refs. Rept. no. PWA-1877.

Ceramics and Refractories

NASA N62-10593 $1.10

Denver Research Inst., Colo.
THE SCAVENGING OF TUNGSTEN AND MOLYBDENUM WITH SELECTED RARE EARTHS, by C. Samuel Miller. Quarterly progress rept. no. 2, 1 May-31 July 61, on NASA Grant NsG-61-60. Aug 61, 7p. DRI 2010.

NASA N62-10372 $1.60

Linfield Research Inst., McMinnville, Oregon.
RESEARCH ON SPUTTERING PHENOMENA, SURFACE STABILITY AND VOLTAGE BREAKDOWN FOR ALKALI-COATED REFRACTORY ELECTRODES, by R. W. Strayer, F. M. Charbonnier and others. Quarterly rept. no. 3, 1 Nov 61-31 Jan 62, on NASA Contract NASr-19. [1962] 16p. 4 refs.

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

Engines and Propulsion Systems

NASA N62-13561 $1.60

Aerojet-General Corp., Azusa, Calif.
RESEARCH STUDY TO DETERMINE PROPULSION REQUIREMENTS AND SYSTEMS FOR SPACE MISSIONS, by C. A. Lysdale and E. H. Cavecche. Rept. 1-30 Sep 61, on Contract NAS5-915. 9 Oct 61. 12p. Rept. LO468-7.

NASA N62-11444 $5.60

Aerojet-General Corp., Sacramento, Calif.
A STUDY OF ROCKET ENGINE SYSTEM RELIABILITY. APPENDIX: RELIABILITY ANALYSIS OF HYBRID-PROPULSION SYSTEM, by W. H. Moffat. Quarterly status rept. no. 2, 15 Jan-15 Apr 62, on Contract NASr-66. 16 Apr 62. 52p. Rept. 0599-01Q-2; Rept. 2154.

NASA N62-14600 $1.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
NONEQUILIBRIUM GASDYNAMICS RELATED TO PROPULSION SYSTEMS. Quarterly rept. no. 1, 4 Oct 60-4 Jan 61, on NASA Contract NAS5-670. [1961] 20p. 5 refs. Proj. AD-1482-A.

NASA N62-14627 $1.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
NONEQUILIBRIUM GASDYNAMICS RELATED TO PROPULSION SYSTEMS, by F. K. Moore. Quarterly rept. no. 1, 1 Apr-30 June 62, on NASA Contract NASr-109. [1962] 17p. 12 refs. Proj. AD-1689-A.

NASA N62-10697 $1.10

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
NONEQUILIBRIUM GASDYNAMICS RELATED TO PROPULSION SYSTEMS. Quarterly rept. no. 4, 4 July-4 Oct 61, on NASA Contract NAS5-670. [1961] 9p. 3 refs. Proj. no. AD-1482-A.

NASA N62-14258 $1.60

Electro-Optical Systems, Inc., Pasadena, Calif.
CONDENSER HEAT REJECTION SYSTEMS, by Lance G. Hays and Arthur Widawsky. Monthly progress rept. 1 Feb-1 Mar 61, on Contract NAS7-11. 8 Mar 61, 12p. EOS-588-ML-4.

NASA N62-13965 $6.60

Guggenheim Labs. for the Aerospace Propulsion Sciences, Princeton U., N. J.
EXPERIMENTAL STUDIES OF TRANSVERSE WAVES IN A CYLINDRICAL CHAMBER, by William D. Allen. Rept. on NASA Grant NsG-99-60. 8 June 62, 62p. 3 refs. Aeronautical Engineering rept. 607.

NASA N62-10436 $1.10

Iowa State U. [of Science and Tech.] Ames.
PREDICTION OF AXIAL-FLOW TURBO-MACHINE PERFORMANCE BY BLADE-ELEMENT METHODS, by G. K. Serovy and J. C. Lysen. Rept. on NASA Grant NsG-62-60. 1 Aug 61, 6p. 30 refs.

NASA N62-13954 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
NOTE ON THE ION BEAM NEUTRALIZATION PROBLEM IN THREE DIMENSIONS, by P. E. Kaus and Paul H. Levine. Rept. on NASA Contract NAS7-100. 7 June 62, 11p. 2 refs. JPL-TR-32-294.

NASA N62-13558 $3.60

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
PERFORMANCE IMPROVEMENT OF THE SUBSONIC TRANSPORT-PROPULSION, by Mark R. Nichols and Arvid L. Keith, Jr. [1961] 33p. 8 refs.

NASA N62-13944 $1.25

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYTICAL INVESTIGATION OF PERFORMANCE OF TWO-STAGE TURBINE OVER A RANGE OF RATIOS OF SPECIFIC HEATS FROM 1.2 TO 1.2/3, by Warren J. Whitney and Warner L. Stewart. July 62, 47p. 4 refs. NASA TN D-1288.

NASA N62-13931 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
COMPARATIVE MEASUREMENTS OF SINGLY AND DOUBLY IONIZED MERCURY PRODUCED BY ELECTRON-BOMBARDMENT ION ENGINE, by Nelson L. Milder. July 62, 22p. 9 refs. NASA TN D-1219.

NASA N62-13934 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
DESIGN AND PERFORMANCE OF A LIQUID-HYDROGEN, LIQUID-OXYGEN GAS GENERATOR FOR DRIVING A 1000-HORSEPOWER TURBINE, by Nick J. Sekas and Loren W. Acker. July 62, 29p. 4 refs. NASA TN D-1317.

AD-255 009 $1.60

Stockholm U. (Sweden).
SADDLE POINT APPROXIMATION FOR THE DISTRIBUTION OF SPECTRAL ESTIMATES, by R. H. Jones. Technical rept. no. 2 on Contract Nonr(G) 0003-61. Mar 61, 12p. 4 refs.

DESCRIPTORS: *Spectrographic data, Experimental data, *Statistical distributions, *Integrals, Statistical analysis, Statistical processes, Number theory, Mathematics.

The saddle point method is used to approximate the distribution function of a quadratic form in normal variates; the results are useful for obtaining confidence limits of these distributions and the distributions of ratios of quadratic forms.

Computing Devices

AD-283 252 $2.25

American Inst. for Research, Pittsburgh, Pa.
DATA FLOW: THE GENERAL PROBLEM AND A COGNITIVE MODEL, by Charles W. Dean and Jerome V. Lisovich. Rept. Nov 60-Jan 62, on Contract AF 33(616)7477. May 62, 77p. 26 refs. Rept. no. AIR-C39-1/62-TR; MRL-TDR-62-42.

DESCRIPTORS: *Data processing systems, Design, Model tests, Human engineering, Computer logic.

The purpose of this study was to determine the state-of-the-art in data flow and to formulate a data flow model. An investigation of the state-of-the-art was conducted, emphasizing human factors literature, which revealed that a practical data flow model does not exist. The data flow model designed for this project is intended to facilitate the understanding of system function, provide systematic techniques with which to generalize between systems and to improve communications between various disciplines involved in systems work. The model is also intended to serve as the basis for various types of system training. The mechanics of the model include a verbal representation method, a graphic representation method, and a calculus. The verbal and graphic aspects of the model facilitate the communication and concepualization of functional relationships within a system and the functional similarity or dissimilarity between both systems and parts of systems. The model calculus, based on formal logic, facilitates the analysis and perception of the functional strategies of the system. (Author)

ANL-6576 $0.50

Argonne National Lab., Ill.
COMPILER INTO GEORGE ASSEMBLY ROUTINE, by R. George. Rept. on Contract W-31-109-eng-38. June 62, 18p.

PB 159 689 $1.10

Auerbach Electronics Corp., Philadelphia, Pa.
ANNUAL SUMMARY REPORT. Rept. for 1 Apr 60-31 Mar 61, on Contract Nonr-3235(00). [1961] 4p. Technical rept. 1048-TR-4.

DESCRIPTORS: *Data processing systems, Data, Collecting methods, Catalogs, Indexes, Documentation.

Data were gathered on all types of information processing systems, covering both domestic and foreign manufactured items. Not only was a comprehensive selection of specifications and descriptive manuals collected but an increasing number of formal presentations were made by manufacturers. The majority of the systems covered in depth were large-scale data processing equipments. An extensive trip through Western Europe was conducted, visiting the majority of the principal information processing equipment manufacturers, laboratories, and universities or technical colleges to secure latest information on their product developments and available data on technique developments within their laboratories.

DLCS-4000301(Rev.) $7.60

Duquesne Light Co., Shippingport, Pa.
AUTOMATIC DATA LOGGING AND COMPUTING SYSTEM CALIBRATION TEST. CORE I, SEED 3. 8 Mar 62, 2nd issue 19 June 62, 79p.

KAPL-M-RPC-3 $6.60

Knolls Atomic Power Lab., Schenectady, N. Y.
FICS: A PROGRAM TO COMPUTE FEW-GROUP CONSTANTS WITHIN THE KARE DIFFUSION THEORY SYSTEM, by Gordon L. Johns. Rept. on Contract W-31-109-eng-52. 15 Mar 62, 66p. 14 refs.

KAPL-M-RPC-4 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
MINK (MUFT-KATE INTO KARE), by Agnes L. Liedel. Rept. on Contract W-31-109-ENG-52. Apr 62, 14p. 3 refs.

AD-276 359 repriced $0.50

Rome Air Development Center, Griffiss AFB, N. Y.
THEORY OF A MULTIPLE TAPE QUEUING SYSTEM AND ITS APPLICATION TO ELECTRONIC SYSTEMS, by Edward Morenoff and John B. McLean. May 62, 19p. RADC-TDR-62-167; NASA N62-13023.

DESCRIPTORS: Data storage systems, *Magnetic tape, Data processing systems, Probability.

A storage technique known as RAPTAP (Rapid Access Parallel Tape) has been conceived in an effort to provide a storage medium which has both a greatly reduced access time to desired data and economy of operation. These objectives are satisfied by a RAPTAP innovation which results in the ability to simultaneously

NASA N62-10540 $1.10

National Bureau of Standards, Washington, D.C.
VAPORIZATION AND THERMIONIC EMISSION OF REFRACTORY MATERIALS, by G. F. Rouse, R. F. Walker, and N. J. Carrera. Semi-annual status rept. no. 2 on NASA Order R-6. 30 Nov 61, 10p. 1 ref. NBS rept. 7392.

NASA N62-10830 $1.10

National Bureau of Standards, Washington, D. C.
VAPORIZATION AND THERMIONIC EMISSION OF REFRACTORY MATERIALS, by R. F. Walker, N. J. Carrera, and G. F. Rouse. Semi-annual status rept. no. 3 on NASA Order R-57. 1 Mar 62. NBS rept. no. 7451.

Fuels, Lubricants, and Hydraulic Fluids

NASA N62-14065 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
ANALYTICAL AND EXPERIMENTAL INVESTIGATION OF FORCES AND FREQUENCIES RESULTING FROM LIQUID SLOSHING IN A SPHERICAL TANK, by Andrew J. Stofan and Alfred L. Armstead. July 62, 33p. 14 refs. NASA TN D-1281.

NASA N62-14068 $0.50

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EXPERIMENTAL DAMPING OF LIQUID OSCILLATIONS IN A SPHERICAL TANK BY POSITIVE-EXPULSION BAGS AND DIAPHRAGMS, by Andrew J. Stofan and Albert J. Pavli. July 62, 19p. 8 refs. NASA TN D-1311.

NASA N62-14069 $0.75

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va.
INVESTIGATION OF THE DAMPING OF LIQUIDS IN RIGHT-CIRCULAR CYLINDRICAL TANKS, INCLUDING THE EFFECTS OF TIME-VARIANT LIQUID DEPTH, by David G. Stephens, H. Wayne Leonard, and Tom W. Perry, Jr. July 62, 31p. 16 refs. NASA TN D-1367.

NASA N62-13501 $10.10

Rocketdyne, Canoga Park, Calif.
H-1 LUBRICATION STUDIES, by O. I. Thorsen. Rept. 1 Nov 60-1 Mar 62, on letter Contract NAS 7-3. 1 Mar 62, 127p. 55 refs. Rept. R-3451.

NASA N62-10617 $1.10

Rocket Research Lab., Ohio State U., Columbus.
EFFECT OF IGNITION METHOD ON DETONATION INDUCTION DISTANCES IN HYDROGEN-OXYGEN MIXTURES, by Loren E. Bollinger, James A. Laughrey, and Rudolph Edse. Rept. on NASA Grant NsG-44-60. [1961] 10p. 2 refs.

MATHEMATICS

NASA N62-14624 $10.10

Automatic Control Center, Purdue U., Lafayette, Ind.
RAPID ALGEBRAIC TECHNIQUES FOR SOLVING AUTOMATIC CONTROL EQUATIONS, by James Wallace Moore. Doctoral thesis. Rept. on NASA Grant NsG-28-59. June 62, 124 p. 8 refs.

WAPD-TM-327 $2.50

Bettis Atomic Power Lab., Pittsburgh, Pa.
BLOCK ITERATIVE METHODS FOR TWO-CYCLIC MATRIX EQUATIONS WITH SPECIAL APPLICATION TO THE NUMERICAL SOLUTION OF THE SECOND ORDER SELF ADJOINT ELLIPTIC PARTIAL DIFFERENTIAL EQUATION IN TWO DIMENSIONS, by Louis A. Hageman. Rept. on Contract AT(11-1)-GEN-14. Apr 62, 139p. 30 refs.

WAPD-TM-315 $0.50

Bettis Atomic Power Lab., Pittsburgh, Pa.
M0150 - A FORTRAN PROGRAM TO SOLVE THE DOUBLE P-3 EQUATIONS IN SLAB GEOMETRY, by R. M. Cantwell. Rept. on Contract AT(11-1)-GEN-14. Apr 62, 14p. 2 refs.

NASA N62-12485 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A WEIGHT FORMULA FOR GROUP CODES, by Gustave Solomon. Rept. on Contracts NAS7-100, AF 19(604)7400, and ARPA Order 56-61. 1962, 4p. 3 refs.

KAPL-2206 $1.00

Knolls Atomic Power Lab., Schenectady, N. Y.
COMPARISON OF METHODS OF INTEGRATING THERMAL TRANSPORT EQUATION, by W. B. Jordan. Rept. on Contract W-31-109-eng-52. 22 June 62, 35p. 4 refs.

KAPL-M-GLB-8 $2.60

Knolls Atomic Power Lab., Schenectady, N.Y.
STATISTICAL TOLERANCE LIMITS - WHAT ARE THEY?, by G. L. Burrows. Rept. on Contract W-31-109-ENG-52. 24 May 62. 23p. 8 refs.

an experimental model study and subsequent analysis. Paying particular attention to the peak pressures produced, measurements were compared with a simplified formula which was developed from theoretical considerations, to allow the peak pressure to be determined from driving pressure, piston mass, maximum piston velocity and initial conditions in the barrel. In addition, the motion of the piston following the compression peak was studied, and correlated with a rough analysis. (Author)

NASA N62-10591 $3.60

New York U. Coll. of Engineering, N. Y.
MEASUREMENT OF TORSIONAL RIGIDITY OF STIFFENED PLATES, by Herbert Becker and George Gerard. Rept. on NASA Grant NsG-17-59. Oct 61, 36p. 12 refs. Technical rept. SM 61-14.

SCTM-342-61(13) $1.60

Sandia Corp., Albuquerque, N. Mex.
DEFLECTION OF TAPERED CANTILEVER BEAMS, by H. H. Mabie. Nov 61, 19p.

NASA N62-10968 $1.10

Stanford U., Calif.
CHARACTERISTIC ROOTS FOR DONNELL'S EQUATIONS WITH UNIFORM AXIAL PRESTRESS, by W. Nachbar. Technical rept. no. 1 on NASA Grant NsG-93-60. July 61, 6p. 2 refs. SUDAER rept. no. 108.

NASA N62-13600 $8.10

Virginia U., Charlottesville.
AN INVESTIGATION OF THE VIBRATION CHARACTERISTICS OR PRESSURIZED THIN-WALLED CIRCULAR CYLINDERS PARTIALLY FILLED WITH LIQUID, by John S. Mixson. Master's thesis. Mar 62, 82p. 23 refs.

Aerodynamics and Pneumatics

AD-283 099 $2.75

Electronic Systems Lab., Mass. Inst. of Tech., Cambridge.
THE FUNCTIONAL DESIGN OF A SPECIAL-PURPOSE DIGITAL COMPUTER FOR REAL-TIME FLIGHT SIMULATION, by Louis M. Krasny. Rept. 1 May 61-30 Apr 62, on Training Equipment, Simulators, and Techniques for Air Force Systems, Contract AF 33(616)8363. Apr 62, 132p. 28 refs. Rept. no. ESL-R-118, Proj. DSR 8823; MRL-TDR-62-39.

DESCRIPTORS: *Digital computers, Computers, Design, *Flight simulators, Simulation, Functional analysis, Integration, Computer logic.

To determine the ability of a moderate-sized digital computer, such as the M. I. T. TX-O, to solve a complex real-time flight simulation problem, the complete equations for the unrestricted simulation of the F-100A aircraft have been programmed using the TX-O order code. Specific recommendations are made for logical modifications of the TX-O to facilitate real-time simulation. With nine additional orders, the TX-O would solve the full F-100A equations at 23 solutions per second. The areas of function generation, order code specification, usage of subroutines, integration, would length requirement, input and output procedures, decision-making, and high-speed multiplication are investigated in detail with quantitative comparisons between different methods wherever possible. The design methodology and the various design trade-offs described also should be applicable to the functional analysis of other simulation problems of greater or lesser complexity. (Author)

AD-275 831 $6.60

Institute of Aerophysics, U. of Toronto (Canada)
THE ROTATING ARM FACILITY FOR HIGH SPEED LOW DENSITY AERODYNAMIC STUDIES, by I. J. Billington, E. Eggmann and others. Rept. on Contract AF 33(616)6990. Oct 61, 62p. 8 refs. UTIA rept. no. 77; NASA N62-10770.

DESCRIPTORS: Aerodynamics, *Hypersonics, Test facilities, *Wind tunnels, Substitutes, *Centrifuges, Design, Tests, Rotating structures, Instrumentation, Costs, Magnetohydrodynamics, Re-entry aerodynamics, Mathematical analysis.

The feasibility and usefulness of a rotating arm facility for aerodynamic studies at low density has been studied. Structure of the arm itself appears to be the most critical aspect of the design of such a facility. A theory for optimum arm design is outlined and a number of design charts based on this theory are presented. This study suggests that it is mechanically feasible to construct a rotating arm facility with a capability of Mach numbers up to about 8 over a range of pressure levels encompassing most of the low density flow regimes of interest. Although somewhat higher Mach numbers are theoretically possible, justification of the attendant increase in facility size and cost appears doubtful. Based on the theory and design data of this report, facilities with maximum capabilities of 4000 and 8000 ft/sec respectively are discussed. It is concluded that a facility of the 4000 ft/sec class could be designed by direct application of the present analysis. For the higher speed facility, however, analytical investigation and probably some related engineering development work would appear necessary. (Author)

NASA N62-12496 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AN AUTOMATIC TEMPERATURE CONTROL SYSTEM FOR WATER-COOLED STRAIN-GAGE WIND TUNNEL BALANCES, by F. J. Walker. [1961] 14p. 1 ref.

move all tape units under the control of a single tape control unit, and in the ability to move magnetic tape at rapid rewind tape speeds over sections of tape known not to contain desired data, rather than at the normal slower search speeds. The selection and retrieval of data from the RAPTAP Storage System is directly analogous to the selection of data from disc file systems. The RAPTAP technique is described in this report, and the economy of operation and the reduction of access time to desired data are considered in terms of the following modes of querying an ordered array of data: (1) random queries; (2) batched queries; and (3) independent groups of random queries, each group containing related subqueries.

SCTM-92-62(24) $3.60

Sandia Corp., Albuquerque, N. Mex.
BASIC FORMAT REQUIREMENTS FOR PUNCHED PAPER TAPE DATA SYSTEMS, by G. R. Elliott. Apr 62, 40p.

MECHANICS

PB 181 398 $0.50

Bureau of Naval Weapons, Washington, D. C.
TORQUE TOOL CALIBRATORS TORSION TYPE 10 OZ-IN TO 1000 LB-FT. Technical manual, Navy Calibration Program. 1 June 62, 16p. Instrument Calibration Procedure MU-03, supersedes 625-IP-6.

DESCRIPTORS: *Torque, Wrenches, Calibration, Instrumentation, Instruction manuals, Torsion bars.

The Test Instrument consists primarily of a torsion bar, input shaft, and pointer-scale assembly. When torque is applied to the input shaft, the torsion bar is distorted, causing an angular displacement of the pointer which is proportional to the applied torque.

PB 181 397 $0.50

Bureau of Naval Weapons, Washington, D. C.
TORQUE WRENCH CALIBRATOR, BYTREX 30250. Technical manual, Navy Calibration Program. 15 July 62, 9p. Instrument Calibration Procedure MU-05.

DESCRIPTORS: *Torque, Wrenches, Calibration, Instrumentation, Instruction manuals.

NASA N62-13707 $1.60

Catholic U. of America, Washington, D. C.
CREEP BENDING OF A VISCOELASTIC BEAM-COLUMN, by J. H. Baltrukonis and M. Chi. Technical rept. no. 2 on NASA Grant NsG-125-61. Nov 61, 20 p. 4 refs.

NASA N62-13706 $2.60

Catholic U. of America, Washington, D. C.
FORCED TRANSVERSE VIBRATIONS OF A SOLID, ELASTIC CORE CASE-BONDED TO AN INFINITELY-LONG, RIGID CYLINDER, by J. H. Baltrukonis. Technical rept. no. 1 on NASA Grant NsG-125-61. Aug 61, 25 p.

NASA N62-10459 $3.60

Florida U. Engineering and Industrial Experiment Station, Gainesville.
ELASTIC INSTABILITY OF PRESSURIZED CYLINDRICAL SHELLS UNDER COMPRESSION OR BENDING, by S. Y. Lu and W. A. Nash. Technical rept. no. 1 on NASA Grant NsG-16-59. Jan 62, 34p. 9 refs.

NASA N62-10694 $4.60

Iowa Engineering Experiment Station, Ames.
THERMAL STRESSES IN CIRCULAR DISCS, Final rept. on NASA Contract NASw-39. Aug 59, 41p. 18 refs.

NASA N62-14045 $1.10

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
MEASUREMENTS OF DRAG AND WAKE STRUCTURE IN MAGNETO-FLUID DYNAMIC FLOW ABOUT A SPHERE, by T. Maxworthy. Rept. on NASA Contract NAS7-100. June 62, 10p. 6 refs. JPL-TR-32-236.

KAPL-M-EC-19 $9.10

Knolls Atomic Power Lab., Schenectady, N. Y.
SOR-II: A PROGRAM TO PERFORM STRESS ANALYSIS OF SHELLS OF REVOLUTION, by Julius A. Mirabal and Donald G. Dight. Rept. on Contract W-31-109-ENG-52. 1 June 62, 106p. 12 refs.

AD-276 050 $5.60

National Research Council of Canada. Div. of Mechanical Engineering, Ottawa (Canada).
REBOUND OF A HIGH SPEED PISTON BY GAS COMPRESSION IN A CLOSED TUBE, by R. J. Stalker. Mar 61, 53p. 6 refs. Rept. no. MT-42; NRC no. 6622.

DESCRIPTORS: *Pistons, *Gases, Pressure, *Shock tubes, Test equipment, Oscillation, Damping, Measurement, Shock waves, Reflection, Supersonic flow, Friction, Entropy, Instrumentation, Piezoelectric transducers, Schlieren photography, Tests, Tables, Experimental data.

An investigation of the rebound of a high speed piston from the closed end of a tube was undertaken, through

Hydrodynamics, Hydraulics, and Hydrostatics

NASA N62-14636 $3.60

Case Inst. of Tech., Cleveland, Ohio.
COVARIANT TREATMENT OF LINEARIZED MAGNETO-FLUID DYNAMICS, by F. Winterberg. Technical rept. no. A-5 on NASA Grant NsG-198-62. [1962] 31p. 1 ref.

DC-54-1-75 $6.60

General Electric Co., Cincinnati, Ohio.
SOURCE BOOK FOR FLOW THROUGH PACKED BEDS, by M. E. Lapides and R. C. Brubaker. Preliminary rept. on Contract AT(11-1)-171. 12 Jan 54, 58p. 89 refs.

NASA N62-11522 $9.60

Michigan U. Coll. of Engineering, Ann Arbor.
CAVITATION DAMAGE TESTS WITH WATER IN A CAVITATING VENTURI, by F. G. Hammitt, P. T. Chu and others. Technical rept. on NASA Grant NsG-39-60. Mar 62, 104p. 47 refs. Rept. 03424-4-T.

NASA N62-14020 $5.60

Michigan U. Coll. of Engineering, Ann Arbor.
OBSERVATIONS AND MEASUREMENTS OF FLOW IN A CAVITATING VENTURI, by F. G. Hammitt, P. T. Chu and others. Technical rept. no. 5 on NASA Grant NsG-39-60. Apr 62, 53p. 17 refs. Rept. 03124-5-T.

METALLURGY

USBM-U-952 $1.00

Albany Metallurgy Research Center, Ore.
METALLURGICAL PROGRESS REPORT. Quarterly rept. no. 15, 1 Apr-30 June 62, on Contract AT(11-1)-599. 35p.

IS-437 $0.50

Ames Lab., Iowa State U. of Science and Tech.
THE ELECTRICAL RESISTIVITY OF MOLTEN AND SOLID THORIUM-MAGNESIUM EUTECTIC, by Douglas M. Provow and Ray W. Fisher. Rept. on Contract W-7405-eng-82. May 62, 16p. 9 refs.

NASA N62-10151 $5.60

Battelle Memorial Inst., Columbus, Ohio.
INVESTIGATION OF MECHANICAL PROPERTIES OF CHROMIUM, CHROMIUM-RHENIUM AND DERIVED ALLOYS, by B. C. Allen, C. N. Reid, and R. I. Jaffee. Summary rept. 1 Mar 61-28 Feb 62, on Contract NASw-101. Mar 62, 56p. 14 refs.

NASA N62-10149 $1.60

Battelle Memorial Inst., Columbus, Ohio.
PREPARATION, CONSOLIDATION, AND FABRICATION OF CHROMIUM-RHENIUM, CHROMIUM-MANGANESE, AND OTHER CHROMIUM-BASE ALLOYS, by B. C. Allen and R. I. Jaffee. Progress rept. 1 Mar 61-28 Feb 62, on NASA Contract NASw-101. Feb 62, 18p. 5 refs.

PB 159 673 $1.10

Corrosion Lab., Mass. Inst. of Tech., Cambridge.
TERNARY ALLOYS, by Heinz Stepper. Final rept. 15 Sep 60-28 Jan 61, on Contract Nonr-1841(09). 25 Mar 61, 4p. DSR-7475.

DESCRIPTORS: *Alloys, Iron alloys, Nickel alloys, Cobalt alloys, Molybdenum alloys, Electrochemistry, Corrosion research.

In the Fe-Ni-Mo and Fe-Cr-Co ternary diagrams, a series of alloys containing 30, 50 and 70% cobalt, and a series of alloys containing 30, 50 and 70% nickel were investigated. Pure molybdenum and cobalt have been obtained for preparation of the alloys.

NASA N62-11513 $1.60

Denver Research Inst., Colo.
RESEARCH ON THE EFFECT OF SELECTED RARE-EARTH SCAVENGERS ON THE PROPERTIES OF TUNGSTEN AND MOLYBDENUM, by C. Samuel Miller and Donald T. Klodt. Quarterly progress rept. no. 1, 1 Feb 62-30 Apr 62, on NASA Grant NsG-61-60, suppl. no. 1-61. May 62, 13p. 1 ref. DRI no. 2039.

NASA N62-14150 $1.10

Denver Research Inst., Colo.
THE SCAVENGING OF TUNGSTEN AND MOLYBDENUM WITH SELECTED RARE EARTHS, by C. Samuel Miller and Donald T. Klodt. Quarterly progress rept. no. 3, 1 Aug-1 Oct 61, on Grant NsG-61-60. Nov 61, 9p. DRI-2018.

NASA N62-10049 $1.60

Denver Research Inst., Colo.
THE SCAVENGING OF TUNGSTEN AND MOLYBDENUM WITH SELECTED RARE EARTHS. Quarterly progress rept. no. 4, 1 Nov 61-31 Jan 62, on NASA Grant NsG-61-60, suppl. 1-61. Feb 62, 13p. 3 refs. DRI-2029.

DRI-2040 $6.60

Denver Research Inst., Colo.
STUDY OF FACTORS INFLUENCING DUCTILITY OF IRON ALUMINUM ALLOYS, by George P. Rauscher, Jr., Frank C. Perkins, and Joseph F. Nachman. Final rept. on Contract AT(11-1)-742. 29 Dec 61, 60p. 16 refs.

NASA N62-14084 $5.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena. THE LAMINAR BOUNDARY LAYER ON A DISK OF FINITE RADIUS IN A ROTATING FLOW. PART I: NUMERICAL INTEGRATION OF THE MOMENTUM-INTEGRAL EQUATIONS AND APPLICATION OF THE RESULTS TO THE FLOW IN A VORTEX CHAMBER, by Leslie M. Mack. Rept. on Contract NAS7-100. 20 May 62, 52p. 37 refs. JPL-TR-32-224.

NASA N62-13555 $10.10

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. FLIGHT DATA AND CONSIDERATIONS OF THE DYNAMIC RESPONSE OF AIRPLANES TO ATMOSPHERIC TURBULENCE, by John C. Houbolt, Roy Steiner, and Kermit G. Pratt. [1962] 124p. 89 refs.

NASA N62-13979 $1.25

Langley Research Center, National Aeronautics and Space Administration, Langley Station, Va. FLUTTER OF AERODYNAMICALLY HEATED ALUMINUM-ALLOY AND STAINLESS-STEEL PANELS WITH LENGTH-WIDTH RATIO OF 10 AT MACH NUMBER OF 3.0, by Lawrence D. Guy and Herman L. Bohon. July 62, 42p. 7 refs. NASA TN D-1353.

AD-276 053 $2.60

National Aeronautical Establishment (Canada). OSCILLATORY EXPERIMENTS IN A HELIUM HYPERSONIC WIND TUNNEL, by K. Orlik-Ruckemann and J. G. LaBerge. Mar 62, 26p. 17 refs. Aeronautical rept. LR-335; NRC no. 6779.

DESCRIPTORS: *Wings, Aerodynamics, *Oscillation, *Hypersonic wind tunnels, *Helium, Aerodynamic configurations, Airfoils, Wedges, Lift, Pressure, Load distribution, Wind tunnel models, Model tests, Calibration, Hypersonic flow.

Very little information is available on the oscillatory aerodynamics of various configurations at hypersonic speeds. In particular, no such information seems to exist on lifting configurations. An investigation has been recently undertaken at N.A.E. in order to determine the aerodynamic reactions on oscillating wings in hypersonic flows. Inviscid data have been calculated for several two-dimensional wings and a series of experiments has been undertaken to verify the theoretical analysis and to determine the effects of viscous flow phenomena.

AD-275 777 $7.60

National Aeronautical Establishment (Canada). OBSERVATIONS ON THE FLOW NEAR A LIFTING PROPELLER, by R. H. Wickens and I. S. Gartshore. Dec 61, 80p. 18 refs. Aeronautical rept. LR-325; NRC no. 6705.

DESCRIPTORS: *Vertical take-off planes, *Aerial propellers, Lift, Aerodynamics, Fluid flow, Wake, Take-off, Airplane landings, Water tunnels, Hydrodynamics, Photographic analysis, Vortices, Mathematical analysis, Model tests.

The flow around a 3 1/2-inch diameter, 3-bladed propeller with its axis of rotation normal to the free stream direction has been examined in the 10-inch x 13-inch N. A. E. flow visualization water tunnel. Both qualitative and quantitative information have been derived from photographs. At high advance ratios, the water tunnel observations showed that the wake is apparently composed of two main trailing vortices, of unequal strength, and a third lying between these. All three vortices are interpreted as projections of cycloidal vortices shed from the moving blades. Several theoretical models have been evaluated using experimental velocity distributions, and the results are compared with measured forces. An application of lifting surface theory was found to be the best method of analysis. (Author)

AD-276 019 $5.60

National Aeronautical Establishment (Canada). THE VIBRATION DAMPING OF COMPLEX STRUCTURES SUBJECTED TO ACOUSTIC EXCITATION, by R. A. Mangiarotty. Dec 61, 59p. 71 refs. Aeronautical rept. LR-323; NRC no. 6695.

DESCRIPTORS: *Airframes, Jet planes, Vibration, *Acoustics, Mathematical analysis, *Aerodynamics, Turbulent boundry layer, Damping, Sheets, Jet engine noise, Excitation, Stresses, Fatigue (Mechanics).

This report was prepared with the object of examining the progressive scientific and technical contributions in the field of the acoustic fatigue of structures and, in particular, the application of damping treatment to complex structures subjected to acoustic excitation forces. It was also attempted to examine the status of the outstanding problems as they appear from available published literature, and to discuss possible methods for their solution.

SC-4691(RR) $0.75

Sandia Corp., Albuquerque, N. Mex. COMPILATION AND CORRELATION OF MODEL STARTING LOADS FROM SEVERAL SUPERSONIC WIND TUNNELS, by R. C. Maydew. June 62, 30p. 9 refs.

SCR-518 $4.60

Sandia Corp., Albuquerque, N. Mex. DRAG ON A RIGHT CIRCULAR CYLINDER IN RARIFIED FLOW AT LOW SPEED RATIOS, by William B. Brooks and George E. Reis. June 62, 48p. 10 refs.

NASA N62-13821 $2.60

Syracuse U. Research Inst., N. Y.
ADHESION BETWEEN ATOMICALLY CLEAN METALLIC SURFACES, by Douglas V. Keller, Jr. Semiannual rept. on NASA Grant NsG-159-61. 1 Feb 62, 27p. 30 refs. S.U.R.I. Rept. MET. E. 905-621SA.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

ANL-6589 $2.50

Argonne National Lab., Ill.
THE ELECTRIC-DIPOLE GAMMA-RAY STRENGTH FUNCTION FOR HEAVY EVEN-EVEN NUCLEI, by Raymon T. Carpenter. Rept. on Contract W-31-109-eng-38. Aug 62, 130p. 40 refs.

NAA-SR-MEMO-7221 $1.60

Atomics International, Canoga Park, Calif.
AN IRRADIATION TEST OF U, U-0.04 w/o Be, U-0.2 w/o Cr, U-0.1 w/o Ce, U-0.1 w/o Y, AND U-0.2 w/o V, by G. G. Bentle. 20 Mar 62, 11p. 4 refs.

NAA-SR-MEMO-7005 $1.60

Atomics International, Canoga Park, Calif.
REMOTE DENSITY MEASUREMENT OF UO_2 PELLETS, by J. Guon, F. W. Gandolfo and others. 9 Jan 62, 11p. 3 refs.

WAPD-T-1456 $1.60

Bettis Atomic Power Lab., Pittsburgh, Pa.
APPLICATION OF DIFFUSION CALCULATIONS TO N-16 SPECIFIC ACTIVITY, by K. Shure and N. R. Williamsen. Rept. on Contract AT(11-1)-GEN-14. June 62, 13p. 5 refs.

BNL-5826 $7.60

Brookhaven National Lab., Upton, N. Y.
THERMOS - A THERMALIZATION TRANSPORT THEORY CODE FOR REACTOR LATTICE CALCULATIONS, by Henry C. Honeck. Sep 61, 77p.

TID-15788 $1.60

Buffalo U., N. Y.
APPLICATIONS OF ISOTOPES IN CHEMICAL KINETICS, by G. M. Harris. Progress rept. 1 Sep 61-31 Aug 62, on Contract AT(30-1)-1578. 1 June 62, 17p.

NYO-10184 $2.60

Consolidation Coal Co., Library, Pa.
EVALUATION OF BETA RADIATION AS A HYDROGENATION CATALYST, by P. M. Yavorsky and E. Gorin. Quarterly technical status rept. no. 1, 1 Mar-31 May 62, on Contract AT(30-1)-2978. 1 July 62, 36p. 14 refs.

GA-2451(Vol. 1) $3.50

General Atomic Div., General Dynamics Corp., San Diego, Calif.
NUCLEAR DATA FOR GAM-I DATA TAPE, by G. D. Joanou, J. S. Dudek and others. Rept. on Contract AT(04-3)-314. 22 Aug 61, 268p. 14 refs.

GA-2451(Vol. II) $3.00

General Atomic Div., General Dynamics Corp., San Diego, Calif.
NUCLEAR DATA FOR GAM-I DATA TAPE, by G. D. Joanou, J. S. Dudek and others. Rept. on Contract AT(04-3)-314. 22 Aug 61, 239p.

GEAP-4006 $1.60

General Electric Co., San Jose, Calif.
SODIUM MASS TRANSFER: III. THE APPLICATION OF LIQUID AMMONIA AS A SODIUM LEACHING AGENT, by H. W. Alter and P. A. McManus. Rept. on Contract AT(04-3)-189. Apr 62, 16p. 20 refs.

HW-69677 $0.50

Hanford Atomic Products Operation, Richland, Wash.
ANALYTICAL METHODS FOR ALKALINE EARTH DETERMINATIONS IN SUPPORT OF THE STRONTIUM-90 RECOVERY PROGRAM, by R. Ko, A. C. Leaf and others. Rept. on Contract AT(45-1)-1350. Sep 61, 19p. 8 refs.

HW-71574 $3.60

Hanford Atomic Products Operation, Richland, Wash.
A LABORATORY STUDY TO DEFINE CONDITIONS FOR LOADING STRONTIUM-90 ON DECALSO FOR HAPO-1A CASK SHIPMENT, by F. M. Smith. Rept. on Contract AT(45-1)-1350. Nov. 30, 1961. 32p. 14 refs.

HW-65453 $1.60

Hanford Atomic Products Operation, Richland, Wash.
URANIUM SWELLING STUDIES: CONSTANT TEMPERATURE IRRADIATION CAPSULE, by B. S. Kosut and R. D. Leggett. Rept. on Contract AT(45-1)-1350. Apr 61, 18p. 7 refs.

AD-282 836 $1.50

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
A STUDY OF QUENCH HARDENING IN PLATINUM AND GOLD, by Harold Louis Gegel. Rept. Dec 60-Jan 61, on Solid State Research and Properties of Matter. May 62, 58p. 56 refs. ASD-TDR-62-329.

DESCRIPTORS: *Gold, *Platinum, *Wire hardening, Impurities, Aging, Energy, Deformation, Stresses, Mechanical properties, *Quenching.

The results of this program have shown that vacancy complexes form during the quenching period when the average quenching speed is less than 10^5C/second. The binding energy for divacancies in gold was estimated to be approximately 0.28 ev. The influence of increased quenching speeds is to increase the temperature recovery range for isochronal recovery. Similarly, fast quenching rates caused an incubation period in the isothermal aging experiments for gold. Two distinct hardening mechanisms exist for platinum and gold when the values of the activation energy for recovery are taken into account. The hardening mechanism for gold is thought to be due to the interaction of dislocations with extended sessile dislocations, and the hardening mechanism for platinum is thought to be due to the interaction of dislocations with dislocation loops. This model has been extended to other F.C.C. metals. (Author)

HW-73511 $1.00

Hanford Atomic Products Operation, Richland, Wash.
HIGH TEMPERATURE OXIDATION OF ZIRCONIUM AND ZIRCALOY-2 IN OXYGEN AND WATER VAPOR, by R. E. Westerman. Rept. on Contract AT(45-1)-1350 Apr 62, 37p. 24 refs.

TID-16222 $9.60

Illinois U., Urbana.
PRESENT KNOWLEDGE ABOUT POINT DEFECTS IN DEFORMED FACE CENTERED CUBIC METALS, by R. W. Balluffi, J. S. Koehler, and R. O. Simmons. Technical rept. no. 26 on Contract AT(11-1)-182. Feb 62, 115p. 147 refs.

KAPL-MEMO-EEB-6 $1.60

Knolls Atomic Power Lab., Schenectady, N. Y.
TENSILE AND SHEAR TESTS AT ROOM TEMPERATURE, by E. E. Baldwin and F. W. Wiesinger. Rept. no. 1 on Contract W-31-109-ENG-52. 25 Nov 53, 13p. 1 ref.

NASA N62-13512 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
INFLUENCE OF COLD ROLLING AND AGING ON THE SHARP NOTCH PROPERTIES OF Ti SHEET, by A. J. Repko and W. F. Brown, Jr. [1962] 22p. 11 refs.

NASA N62-10121 $3.60

Metallurgical Research Labs., Syracuse U., N. Y.
MATERIAL EVALUATION FOR A MACH III TRANSPORT PLANE, by R. J. Sell, C. Chave, and V. Weiss. Quarterly progress rept. no. 3, 24 Oct 61-23 Jan 62, on NASA Contract NASr-43. Feb 62, 32p. MET 873-622-QP3.

NASA N62-10565 $4.60

Michigan U. Coll. of Engineering, Ann Arbor.
SCREENING PROGRAM ON SUPERALLOYS FOR TRISONIC TRANSPORT, by John P. Rowe and James W. Freeman. Interim summary rept. on NASA Grant NsG-124-61. 31 Oct 61, 42p. Rept. ORA-04368-3-T.

NASA N62-13655 $4.60

Michigan U. Coll. of Engineering, Ann Arbor.
SCREENING PROGRAM ON SUPERALLOYS FOR TRISONIC TRANSPORT, by John R. Rowe and James W. Freeman. Interim summary rept. on NASA Grant NsG-124-61. 31 Oct 61, 43p. Rept. 04368-3-T.

NASA N62-10564 $2.60

Michigan U. Coll. of Engineering, Ann Arbor.
SCREENING PROGRAM ON SUPERALLOYS FOR TRISONIC TRANSPORT. REPORT NO. 2. RESULTS FOR COLD-WORKED N155 ALLOY, by John P. Rowe and James W. Freeman. Rept. on NASA Grant NsG-124-61. 15 Nov 61, 26p. 4 refs. Rept. ORA-04368-4-T.

NASA N62-14639 $1.10

[New York U., N. Y.]
EFFECT OF PRESSURE ON METALLURGICAL PHENOMENA, by Harold Margolin. Progress rept. no. 4, 20 Dec 61-20 June 62, on NASA Grant NsG-90-60. [1962] 4p.

NYO-9174 $3.60

Nuclear Materials and Equipment Corp., Apollo, Pa.
THE DECONTAMINATION AND RECOVERY OF PRECIOUS METALS. Quarterly progress rept. 2 Oct-1 Dec 60, on Contract AT(30-1)-2528. 36p. 6 refs.

SCR-524 $2.60

Sandia Corp., Albuquerque, N. Mex.
MEASUREMENT OF BREMSSTRAHLUNG DOSE AND SPECTRUM FROM A 600 KVP PULSED X RAY GENERATOR USING PHOTOGRAPHIC FILM, by G. H. Bouchard. June 62, 20p. 7 refs.

DP-724 $0.50

Savannah River Lab., Aiken, S. C.
CONTAINMENT BOX FOR RADIOACTIVE MATERIALS, by Albert R. Symonds and W. Harold Leith. Rept. on Contract AT(07-2)-1. July 62, 10p. 4 refs.

PB 158 461 $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
RADIATION DAMPING OF SPINNING PARTICLES, by H. C. Corben. 9 Aug 61, 18p. 16 refs. Rept. no. 9844-0027-RU-000.

DESCRIPTORS: *Particles, *Nuclear spins, Damping, Relativity theory, Quantum mechanics, Inertia, Equations of motion, Spins.

The disagreement in the literature on the basic classical equations of a spinning particle is summarized and the relations between the various theories are outlined. The theory of a charged particle with spin is developed for the case in which radiation damping is included and the particle may possess a moment of inertia about an axis orthogonal to the spin. It is found that the radiation damping terms may be formally eliminated from the equations of motion by redefining the momentum, mass and rate of change of spin. The redefined mass is no longer a constant of the motion and the supplementary condition, that the polar vector associated with the spin should vanish in the rest system, does not hold for the redefined spin. (Author)

UNC-5013 $2.60

United Nuclear Corp., White Plains, N. Y.
CARBIDE FUEL DEVELOPMENT, by A. Strasser and K. Taylor. Progress rept. 1 Jan-31 Mar 62, on Contract AT(30-1)-2899. 28 May 62, 28p.

GEAP-3869 $1.60

Vallecitos Atomic Lab., Pleasonton, Calif.
MARITIME LOOP IRRADIATION PROGRAM, SAVANNAH 1 FUEL IRRADIATION, by D. W. Danielson and R. S. Gilbert. Quarterly progress rept. 1 July-30 Sep 61, on Contract AT(04-3)-189. 21 Dec 61, 17p. 4 refs.

NASA N62-10703 $6.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
SOME CONSIDERATIONS FOR RADIOMETER DESIGN AND APPLICATION AT 70 GIGACYCLES, by Lawrence Ball. Rept. on NASA Grant NsG-74-60 and Contract AF 33(616)6158. 1 Oct 61, 61p. 17 refs. Rept. no. 1093-7.

NASA N62-11135 $1.60

General Electric Co., Philadelphia, Pa.
MICROWAVE DRIVEN MAGNETIC PLASMA ACCELERATOR "CYCLOPS." Quarterly rept. no. 1, 1 Mar-31 May 61, on NASA Contract NAS5-1046. [1961] 15p.

HW-52448 $1.10

Hanford Atomic Products Operation, Richland, Wash.
BETA FIELD DOSE RATE DETERMINATION FOR ANGULAR RESPONSE WITH THE SOUP BOWL DOSE RATE METER, by J. F. Evans. Rept. on Contract AT(45-1)-1350. 12 Sep 57, 9p.

HW-73335 $1.75

Hanford Atomic Products Operation, Richland, Wash.
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THE DEVELOPMENT OF A LOW TEMPERATURE VAPOR FILLED THERMIONIC CONVERTER FOR NUCLEAR APPLICATIONS, by F. G. Block and J. J. O'Grady. Quarterly technical rept. no. 1, 20 June-30 Sep 61, on Contract NObs-84823. Oct 61, 74p. 5 refs.

DESCRIPTORS: *Thermionic converters, Design, Construction, Temperature, Vapors, Plasma physics, Cesium, Ionization, Radiation instruments, Reactor fuels, Heat.

The initial effort will include the development of a converter of ceramic and metal materials to duplicate the thermionic conversion characteristic of the RCA Laboratories converters at a temperature of approximately 1200° Centigrade. Using this design as a basis, a converter will then be developed suitable for use with nuclear fuel. The objective characteristics of this converter are: (1) operation at approximately 1200° Centigrade; (2) a minimum thermal-to-electrical efficiency of ten percent; and (3) a power density of 2.5 watts per square centimeter. Life tests will be performed. Many ceramic-metal test vehicles were fabricated to assist in the determination of materials and geometries required of a converter designed toward the above characteristics. Converter operation was obtained at true temperatures of approximately 1200° Centigrade with both "Plasma Triode" and "Ball-of-Fire" type thermionic converters. The basic configurations required of the "Plasma-Triode" converter and the "Ball-of-Fire" converter were determined. These modes of operation have been the basis for the design of both planar and cylindrical geometries.

DP-701 $0.75

Savannah River Lab., Aiken, S. C.
BUCKLINGS OF Pu-H_2O SYSTEMS, by H. K. Clark. Rept. on Contract AT(07-2)-1. May 62, 28p. 17 refs.

DP-707 $2.50

Savannah River Lab., Aiken, S. C.
A COMPUTER PROGRAM FOR ECONOMIC STUDIES OF HEAVY WATER POWER REACTORS, by James W. Wade. Rept. on Contract AT(07-2)-1. May 62, 146p. 36 refs.

SRO-69 $1.60

Savannah River Operations Office, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. June 62, 10p.

PNE-109F $1.50

Stanford Research Inst., Menlo Park, Calif.
EARTH DEFORMATION FROM A NUCLEAR DETONATION IN SALT, by R. B. Hoy and R. M. Foose. Rept. on Plowshare program, Proj. Gnome, Contract AT(04-3)-115. 23 May 62. 57p.

NYO-2694 $1.75

United Nuclear Corp., New Haven, Conn.
THE DEVELOPMENT OF URANIUM CARBIDE AS A NUCLEAR FUEL, by H. S. Kalish, F. B. Litton and others. Annual rept. no. 2, 1 May 60-31 Aug 61, on Contract AT(30-1)-2374. 30 Nov 61, 73p. 3 refs.

UNC-5003 $3.60

United Nuclear Corp., White Plains, N. Y.
CARBIDE FUEL DEVELOPMENT, by A. Strasser and K. Taylor. Progress rept. 15 Sep-31 Dec 61, on Contract AT(30-1)-2899. 9 Feb 62, 35p.

UNC-5015 $4.60

United Nuclear Corp., White Plains, N. Y.
FUEL CYCLE DEVELOPMENT PROGRAM. Quarterly progress rept. 1 Jan-31 Mar 62, on Contract AT(30-1)-2374. June 62, 44p. 3 refs.

Electricity and Magnetism

NASA N62-13712 $1.10

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
[SPACE MAGNETOMETER DEVELOPMENT] by T. Gold. Quarterly status rept. on NASA Contract NASr-46. 1 Oct 61, 3p.

NASA N62-13714 $1.10

Center for Radiophysics and Space Research, Cornell U., Ithaca, N. Y.
SPACE MAGNETOMETER DEVELOPMENT, by T. Gold. Quarterly status rept. 1 Sep-1 Dec 61, on NASA Contract NASr-46. 9 Jan 62, 3 p. Rept. CRSR-101.

Molecular Physics and Spectroscopy

PB 159 735 $1.10

Institute of Molecular Physics, U. of Maryland, College Park.
PROGRAM IN MOLECULAR PHYSICS RESEARCH Final rept. on Contract Nonr-595(02). 15 Mar 61, 5p. 34 refs.

DESCRIPTORS: *Scientific research, *Physics, Molecules, *Bibliography.

Lists publications produced under the program.

NASA N62-13945 $1.00

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
EMISSION SPECTRA FROM HIGH-PRESSURE HYDROGEN-OXYGEN COMBUSTION, by Marshall C. Burrows and Louis A. Povinelli. July 62, 37p. 23 refs. NASA TN D-1305.

Optics

AD-283 443 $0.75

American Cyanamid Co., Bound Brook, N. J.
LITERATURE REVIEW OF NEAR INFRARED ATTENUATING MEDIA, by Ralph A. Coleman and Haig C. Donoian. Rept. Apr-Oct 61, on Aerospace System Personnel Protection, Contract AF 33(616)8056 May 62, 30p. 135 refs. MRL-TDR-62-54.

DESCRIPTORS: Optical filters, *Infrared optical materials, Absorption, Attenuation, Optics, Inorganic substances, Organic compounds, *Infrared filters, Bibliography, Plastics.

The purpose of this review was to investigate the literature for near infrared absorbing or attenuating systems with an emphasis on those that allow transmission of visible wavelengths. The spectral range of interest, therefore, lies between 0.4 to 5.0 microns. The types of infrared attenuating systems investigated include inorganic and organic compounds and other optical methods; such as, the interference filters and Christiansen filters. (Author)

NASA N62-13554 $2.60

Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, Md.
SPECTRALLY SELECTIVE PHOTODETECTORS FOR THE MIDDLE AND VACUUM ULTRAVIOLET, by Lawrence Dunkelman, Walter Fowler, and John Hennes [1962] 23p. 29 refs.

NASA N62-14019 $5.60

Melpar, Inc., Falls Church, Va.
FEASIBILITY OF OPTICAL ROTATORY DISPERSION METHODS APPLIED TO THE DETECTION OF EXTRATERRESTRIAL LIFE, by Ira Biel. Quarterly rept. no. 1, 18 Feb-18 May 62, on Contract NASr-85. [1962] 51p.

PB 159 255 $1.10

Space Technology Labs., Inc., Los Angeles, Calif.
A HIGH SPEED PHOTOGRAPHIC STUDY OF THE COHERENT RADIATION FROM A RUBY LASER, by G. L. Clark, R. F. Wuerker, and C. M. York. 29 Nov 61, 9p. 5 refs. Rept. no. 9844-0036-NU-000.

DESCRIPTORS: Crystals, *Ruby, *Lasers, *Optics, Light, Photographic analysis, High speed photography.

A high speed image converter camera has been used to study the time variations as a function of position of the light emitted from a pink ruby operated as a Laser. The gross properties of the emitted light follow the theoretical predictions reasonably well, but the new experimental technique used in these studies reveals a wealth of detail about the time variations of this light which has not been previously reported. A semi-quantitative explanation of these details can be given in analogy with the transient behavior of energy release in pulsed microwave Masers. (Author)

Solid State Physics

AD-276 228 repriced $2.25

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
RESEARCH ON VACUUM EVAPORATED AND CATHODE SPUTTERED THIN FILMS, by R. B. Belser and W. E. Woolf. Rept. for 15 Apr 59-15 Apr 60, on Contract AF 33(616)6379. Feb 62, 85p. 85 refs. WADD-TR-60-381.

All of the specifications, therefore, could not be met. Improvements are still possible in the size and weight of electronic package, and in the lens plating time. It is concluded that, by placing 5 cells (with series-connected subelements) back-to-back, fabrication difficulties will be reduced and specifications met. (Author)

PHYSICS

NASA N62-13668 $2.60

Armour Research Foundation, Chicago, Ill.
EFFECTS OF SOLAR PLASMA AND ELECTROMAGNETIC RADIATION ON THIN FILMS AND SURFACES, by L. Reiffel. Quarterly rept. no. 2, 16 June-15 Sep 61, on Contract NASr-29. 16 Oct 61, 30 p. 3 refs. Rept. ARF-1188-2.

NASA N62-13606 $1.10

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
THE MOBILITIES OF THE ALKALI METAL IONS IN THEIR OWN VAPOR, by John W. Sheldon. [1962] 4p. 7 refs.

NASA N62-14628 $1.10

Midwest Research Inst., Kansas City, Mo.
INFLUENCE OF SURFACE COATINGS ON EXOELECTRON EMISSION DURING FATIGUE, by J. C. Grosskreutz. Quarterly progress rept. no. 3, 1 Mar-1 June 62, on NASA Contract NASr-63(02). 11 June 62, 8p. 3 refs.

TID-14975 $5.00

North Carolina U., Chapel Hill.
TABLES OF SOLID ANGLES. I. SOLID ANGLE SUBTENDED BY A CIRCULAR DISC. II. SOLID ANGLE SUBTENDED BY THE LATERAL SURFACE OF A RIGHT CIRCULAR CYLINDER, by A. V. H. Masket and William C. Rodgers. July 62, 477p. Extension of ORNL-2170.

ORNL-3114 $8.60

Oak Ridge National Lab., Tenn.
OPTICAL EMISSION FROM IRRADIATED THIN METALLIC FOILS, by A. L. Frank, E. T. Arakawa and others. Rept. on Contract W-7405-eng-26. 18 July 62, 92p. 30 refs.

AD-283 387 $1.00

Pennsylvania State U., University Park.
ACOUSTIC ABSORPTION COEFFICIENTS OF HUMAN BODY SURFACES, by Eugene Ackerman and Fujio Oda. Rept. 1956-1958, on Acoustic Energy Control and Biomechanics of Aerospace Operations, Contract AF 33(616)2770. Apr 62, 24p. 10 refs. MRL-TDR-62-36.

DESCRIPTORS: *Body surface, *Acoustics, *Absorption, Measurement, Reverberation, Differential equations.

Reverberation chamber decay times were measured with and without human body surfaces exposed to the sound field. From these measurements acoustic absorption coefficients were computed for human body surfaces. These were all small compared to similar coefficients for laboratory animals. Typical values for the absorption coefficients measured for human body surfaces were in the range of 1 to 2 percent. Little variation was found from 1 to 20 kc. Measurements were not made outside of these limits. The results are discussed and compared with other values obtained by different methods. (Author)

PB 159 143 $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
CURRENT AND MAGNETIC FIELD DISTRIBUTION FOR AN INFINITELY LONG SUPERCONDUCTOR OF RECTANGULAR CROSS-SECTION, by G. J. Culler. 1 Mar 60, 29p. Rept. no. 9844-0011-RU-000.

DESCRIPTORS: *Superconductors, Conductors, Electric currents, Magnetic fields, Distribution, Numerical analysis, Differential equations, Difference equations.

The numerical results contained in this report give an essentially complete picture of the quantitative manner in which current piles up along the corners of a superconductor. Various cross-sections were chosen varying down to dimensions comparable to the skin depth so that the results obtained here (using the local London equation) may be compared later with those to be obtained from the non-local Pippard equation.

NASA N62-10888 $1.10

Yale U., New Haven, Conn.
ALIGNMENT PRODUCED IN HELIUM BY ELECTRON BOMBARDMENT, by R. Krotkov and Helen K. Holt. [Rept. on NASA Grant NsG-1-59]. [1961] 5p. 4 refs.

TID-16226 $1.60

Heat Transfer Lab., U. of Minnesota, Minneapolis.
RESEARCH ON HEAT TRANSFER TO FLUIDS FLOWING THROUGH NON-CIRCULAR CHANNELS, by E. R. G. Eckert and J. L. Novotny. Progress rept. Mar-June 62, on Contract AT(11-1)-659. June 62, 12p. 2 refs.

NASA N62-13932 $0.75

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
AN ANALYTICAL DETERMINATION OF TEMPERATURE OSCILLATIONS IN A WALL HEATED BY ALTERNATING CURRENT, by Frank A. Jeglic. July 62, 29p. 5 refs. NASA TN D-1286.

NASA N62-13565 $1.10

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
DISCUSSION OF ASME PAPER NO. 62-LUBS-18, "CONTACT TEMPERATURE PRODUCED DURING ROLLING WITH SPIN," by Richard J. Parker. [1962] 3p.

NASA N62-13832 $2.60

Lewis Research Center, National Aeronautics and Space Administration, Cleveland, Ohio.
MEASUREMENT OF LOCAL HEAT TRANSFER COEFFICIENTS FOR FLOW OF HYDROGEN AND HELIUM IN A SMOOTH TUBE AT HIGH SURFACE TO FLUID BULK TEMPERATURE RATIOS, by Walter F. Weiland. 1962, 29p. 8 refs.

AD-276 051 $2.60

National Research Council of Canada. Div. of Mechanical Engineering, Ottawa (Canada).
APPROXIMATE CALCULATION OF THE INTERNAL PARTITION FUNCTIONS OF A, A+ AND A++ IN THE TEMPERATURE RANGE 4,000°K TO 50,000°K, by G. W. F. Pike. 30 Mar 61, 29p. 13 refs. Rept. no. MT-46; NRC no. 6687.

DESCRIPTORS: *Gases, Thermodynamics, *Argon, *Functions, Shock waves, Shock tubes, Physical properties, Ionization, Transport properties, *Quantum statistics, *Probability, Equations of state, Rotation, Vibration, Energy, *High temperature research, Particles, Density, Tables, Pressure.

This report covers the calculation of internal partition functions of A, A+ and A++, in the temperature range of 4,000°K to 50,000°K. Whilst the Tables are primarily intended for utilization in shock calculations, they can be readily applied to any problem involving the static or dynamic ionization of argon. (Author)

AD-283 134 $0.50

Watertown Arsenal Labs., Mass.
FORMATION OF GASEOUS METAL POLYMERS, by Arthur Kant. July 62, 11p. 14 refs. Technical rept. WAL TR 821.6/1.

DESCRIPTORS: *Thermodynamics, *Thermochemistry, Gases, *Metals, *Polymers, Chemical bonds, Crystal structures, Heat of sublimation, Dislocations

Polymeric gaseous metal species of the type M_m will increase relative to the atomic gaseous species, M, when in contact with its solid with increasing temperature if $(m-1)\Delta H_s > \Delta H_m$, where ΔH_s is the heat of sublimation of the solid and ΔH_m the heat of dissociation of the corresponding polymer into atoms. The heat of sublimation is greater than the dissociation energy for practically all metals where the thermal data is available and it is postulated that metal gaseous species will tend tobe dimeric and polymeric at sufficiently high temperatures. The molecules Si_2, Ge_2, and Sn_2 are probably double bonded. (Author)

Wave Propagation

NASA N62-13483 $4.60

Electro-Mechanical Research, Inc., Sarasota, Fla.
EXPERIMENTAL DETERMINATION OF SIGNAL-TO-NOISE RELATIONSHIPS IN PCM/FM TRANSMISSION, by L. R. Brown. Interim rept. on Contract NAS5-505. 20 Oct 62, 47p.

NASA N62-13998 $1.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SCATTERING FROM A HYPERBOLOIDAL REFLECTOR, by W. V. T. Rusch. Rept. on NASA Contract NAS7-100. 2 July 62, 14p. 4 refs. JPL-TR-32-283.

NASA N62-10114 $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
PLASMA MODELS DESCRIBING PROPAGATION IN MAGNETO-IONIC MEDIA, by Richard E. Haskell and E. Howard Holt. Rept. on NASA Grant NsG-48-60. June 61, 17p. 8 refs. Plasma Research Lab. Technical rept. no. 1.

NASA N62-10148 $1.60

Stanford Research Inst., Menlo Park, Calif.
ATTENUATION OF SHF SIGNALS BY PRECIPITATION AT A PROPOSED COMMUNICATION SATELLITE TERMINAL, by Arnett S. Dennis and Ronald T. H. Collis. Research memo. 3 on NASA Contract NASr-49(02). Feb 62, 14p. 22 refs. SRI Project 3773.

DESCRIPTORS: *Thin films, Metal films, Copper, Germanium, Gold, Silver, *Crystal structure, Electrical properties, Physical properties, Electron microscopy, X-ray diffraction analysis, Microstructure, Single crystals, Semiconductors, Growth, Vacuum systems, *Vapor plating.

Thin evaporated films were examined to find methods of improving their properties and structures for use in electronic applications. Effects of choice of substrate, substrate preparation, substrate temperature, metal evaporation rate, and film thickness on film orientation were investigated. Specimens of copper, silver, and gold were evaporated onto monocrystalline NaCl substrates at temperatures from 25° to 500°C. No clearly defined data were obtained on gold and silver films. Copper films showed that at a given temperature ordering increased as evaporation rate or thickness of film increased. Films deposited on amorphous substrates showed larger grain size at higher temperatures but no substantial ordering. Electrical resistance of copper films deposited on NaCl substrates was much higher than films deposited on glass. (Author)

SCR-526 $1.60

Sandia Corp., Albuquerque, N. Mex.
MEASURED BEHAVIOR OF GAMMA RAY PHOTOCONDUCTIVITY IN ORGANIC DIELECTRICS, by S. E. Harrison and P. F. Proulx. June 62, 19p.

SCR-525 $1.60

Sandia Corp., Albuquerque, N. Mex.
TRANSIENT PHOTOCONDUCTIVITY OF POLYSTYRENE AND POLYISOBUTYLENE EXPOSED TO PULSES OF NEUTRON AND GAMMA RADIATION, by F. N. Coppage. June 62, 17p. 12 refs.

NASA N62-11445 $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
CHARGED PARTICLE RADIATION DAMAGE IN SEMICONDUCTORS. II. MINORITY CARRIER DIFFUSION ANALYSIS IN PHOTOVOLTAIC DEVICES, by J. W. Oliver. MR-16 on NASA Contract NAS5-613. 19 Feb 62, 21p. 1 ref. Rept. no. 8987-0001-RU001.

Theoretical Physics

UCRL-10128 $0.75

Lawrence Radiation Lab., U. of California, Berkeley.
PROBE THEORY IN A DENSE PLASMA, by G. Ecker, K. S. Masterson, and J. J. McClure. Rept. on Contract W-7405-eng-48. 21 Mar 62, 32p. 20 refs.

NASA N62-10602 $4.60

New York U., N. Y.
QUANTUM MECHANICAL STUDY OF ATOMS AND MOLECULES, by Roop C. Sahni. Rept. on NASA Grant NsG-76-60. [1961] 46p. 18 refs.

PB 159 091 $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
PLASMOID ROTATION IN A THETA PINCH, by G. L. Clark and R. F. Wuerker. 25 Oct 61, 11p. 7 refs. Rept. no. 9844-0031-RU-000.

DESCRIPTORS: *Plasma physics, Magnetic fields, *Magnetic pinch, Rotation, Photographic analysis, High speed photography.

Ultra-high speed photographic observations have been made of the behavior of the plasma rings or plasmoids formed in a theta pinch due to trapping of magnetic field within the plasma.

Thermodynamics

NASA N62-14066 $2.50

Ames Research Center, National Aeronautics and Space Administration, Moffett Field, Calif.
APPROXIMATIONS FOR THE THERMODYNAMIC AND TRANSPORT PROPERTIES OF HIGH-TEMPERATURE NITROGEN WITH SHOCK-TUBE APPLICATIONS, by Warren F. Ahtye and Tzy-Cheng Peng. July 62, 108p. 27 refs. NASA TN D-1303.

TID-16217 $1.10

Engineering Research Labs., Columbia U., New York.
BASIC EXPERIMENTAL STUDIES OF BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Bruce Matzner. Monthly progress rept. June 62, on Contract AT(30-3)-187. 29 June 62, 2p.

NASA N62-10619 $1.60

Heat Transfer Lab., U. of Minnesota, Minneapolis.
ABSORPTION AND EMISSION CHARACTERISTICS OF DIFFUSE SPHERICAL ENCLOSURES, by E. M. Sparrow and V. K. Jonsson. Rept. on NASA Grant NsG-137-61. [1961] 11p. 1 ref.

NASA N62-10610 $3.60

Heat Transfer Lab., U. of Minnesota, Minneapolis.
ABSORPTION OF THERMAL RADIATION IN V-GROOVE CAVITIES, by W. M. Sparrow and S. H. Lin. Rept. on NASA Grant NsG-137-61. [1961] 34p. 5 refs.

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NASA N62-10150 $3.60

Stanford Research Inst., Menlo Park, Calif.
FORWARD SCATTER FROM PRECIPITATION AS AN INTERFERENCE SOURCE AT STATIONS MONITORING SATELLITES, by Arnett S. Dennis. Research memo. 2(rev.) on NASA Contract NASr-49(02). Nov 61, 27p. 32 refs. SRI Project 3773.

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

NASA N62-11089 $1.60

Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
ON THE ACCURACY OF MEASUREMENTS MADE UPON FILMS PHOTOGRAPHED BY BAKER-NUNN SATELLITE TRACKING CAMERAS, by Karoly Lassovszky, Rept. on NASA Grant NsG-87-60. 18 Sep 61, 16p. 1 ref. SAO Special rept. no. 74.

AD-276 267 repriced $3.00

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
A REVIEW OF THE AIR FORCE MATERIALS RESEARCH PROGRAM, by Donna J. Tate. Rept. 1 July 59-30 June 60. June 61, 193p. 507 refs. WADC Technical rept. 53-373, Supplement 7.

DESCRIPTORS: *Air Force research, Scientific reports, *Materials, *Bibliography, Acoustic insulation, Adhesives, Ceramic materials, Coatings, Composite materials, Electronics, Elastomers, Fibers, Glass textiles, Graphite, Fuels, Hydraulic fluids, Lubricants, Joints, Metals, Metallurgy, Non-destructive testing, Plastics, Polymers, Processing, Synthesis, Metalorganic compounds, Corrosion, Design.

These reports cover basic and applied research in the materials area being conducted by the Metals and Ceramics, Non-Metallic Materials, Physics and Applications Laboratories of the Materials Central. (Author)

HW-73249 $1.50

Hanford Atomic Products Operation, Richland, Wash.
HANFORD FORMAL RESEARCH AND DEVELOPMENT REPORTS 1961. Rept. on Contract AT(45-1)-1350. Jan 62, 59p.

NASA N62-14767 $5.60

Rand Corp., Santa Monica, Calif.
FOREIGN PARTICIPATION IN COMMUNICATION SATELLITE SYSTEMS: THE IMPLICATIONS OF THE FEDERAL COMMUNICATIONS ACT, by Murray L. Schwartz. Rept. no. 3(Final) July-Dec 61, on Contract NASr-21(01). Dec 61, 56p. Memo. RM-2971-NASA

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Vermiculite	S-13	AD-275 300
Vertical take-off planes	S-36	AD-275 777
Viscosity	S-6	PB 160 362
Visual perception	S-13	PB 160 360
Vitreous humor	S-4	AD-283 100
Water	S-12	PB 160 951
	S-27	PB 158 231
Water supplies	S-26	OTS SB-498
Wind tunnels	S-35	AD-275 831
Wings	S-36	AD-276 053
Wire hardening	S-38	AD-282 836
Wood	S-31	PB 159 769

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